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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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SUMMARY OF RECENT ABSTRACTS.*

VIII. TYPHUS GROUP OF FEVERS.

Proteus OX19 type. Vectors: louse and flea.

From the *Lancet* is reproduced (p. 365) a table of the geographical distribution, vectors and reservoir hosts of the fevers of the typhus group.

ROMERO ESCACENA (p. 139) describes an outbreak of typhus, probably louse-borne, in Seville. He notes that the case mortality rate was nil in childhood and adolescence, but was 100 per cent. in persons over 55. The clinical findings are detailed, and special stress is laid on tenderness of the slightly enlarged spleen in the early stages and on the leucocytosis which was commonly found. In 6 per cent. of the cases the Weil-Felix reaction remained negative throughout. Convalescent serum was ineffective in the three cases in which it was used; cardiovascular tonics are regarded as fundamental in treatment. ROMERO ESCACENA *et al.* (p. 540) have investigated five strains of Rickettsiae isolated during the Seville outbreak of louse-borne disease. Four strains caused fever and orchitis in rats, but in the later passages orchitis was rarely seen, and the mortality in rats was low. The authors conclude that the strains were not of murine origin, and that the responses observed in experimental animals are not decisive criteria, but represent the results of adaptation to new animal reservoirs.

OWCZAREWICZ (p. 751) discussed the epidemiology of typhus as it has existed in Poland. He mentions the mildness of the disease in children and the high mortality in doctors and nurses, and in brain workers. The relative freedom from infection of men in motorized units is attributed to the use of petrol. He discusses preparations for impregnation of clothing, one of the best of which is a mixture of petrol, xylol and oil.

LIU and ZIA (p. 143) discuss a case of typhus which occurred in Peiping. Investigation by animal inoculation and passage led them to the conclusion that the Rickettsiae were probably of murine origin (in spite of negative Neill-Mooser reactions), but that in such cases,

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1942, Vol. 39. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

when patients are louse-infested, the disease may be transmitted by the louse. This rat-flea-man-louse-man cycle has been described before from Shanghai and Mexico.

The same authors isolated Rickettsiae from mouse fleas, mice and human lice during an outbreak in Peiping. The flea strain did not give the Neill-Mooser reaction in animals on first isolation, and this is evidence that this reaction is not given by all murine strains. The mouse strain did not survive more than eight passages in rats, an unexpected finding for which no explanation is forthcoming. The louse strain corresponded to the mouse strain. They conclude that the first human case was probably originated by flea transmission from the rodents and later cases were due to louse transmission. In comment MEGAW notes that the commonly accepted criteria for distinguishing between the Rickettsiae of historic and murine typhus were discredited in this investigation.

LIU *et al.* (p. 613) discuss further the question of typhus in Peiping, and bring additional evidence to support their view that flea-borne and louse-borne typhus coexist, and that epidemics may originate from rodent reservoirs.

GROOT *et al.* (p. 140) report small outbreaks of typhus in the louse-infested people of Colombia. The true nature of the disease had not been determined at the time this report was written, but conditions were favourable to spread by lice. Later work, however, enabled GROOT (p. 452) to state that the Rickettsiae of the typhus of Nariño, Colombia, had proved, on investigation, to be of the classical (louse-borne) type. Suspensions of lice collected from a patient were infective for guineapigs. Similarly, PATIÑO-CAMARGO (p. 542) has identified *R. prowazeki*, isolated from patients and from lice, in an outbreak at Bogotá, Colombia.

OTTO and BICKHARDT (p. 538) discuss the toxins of *Rickettsia mooseri* and *R. prowazeki*. These are endotoxins easily destroyed by heat and by treatment with formol or phenol, though the Rickettsiae may remain infective after such treatment. The action of the toxins, which is quite different from that of infection by the living organisms, is rapid in mice, which are killed in a few hours. The toxins are neutralized by specific immune sera.

Several authors have laid stress on the fact that typhus can be acquired by means other than infestation with infected lice. Thus WALTHER (p. 612) reiterates the fact that *R. prowazeki* may remain virulent for several months in dried louse faeces, and that infection by inhalation or by the conjunctival route is possible. The blood of patients with typhus, from the 7th to 12th day of the disease, contains about 100,000 Rickettsiae per cmm., and care should be taken in withdrawing it for examination. The Weil-Felix reaction is positive at 1/160 or over in almost all cases by the 6th day; this titre is regarded as diagnostic, but the author notes that agglutination of Rickettsiae is a more specific test. Infective lice have been recovered from patients 24 days after the end of fever. MCCORMACK (p. 138) gives an account of an outbreak of typhus in Drogheda; the infection was ascribed to the opening of a trunk in which for many years had lain, undisturbed, clothing belonging to members of a family which had suffered from outbreaks of the disease. [If this is the correct view it would appear to have been an infection due to inhalation of infected louse faeces.] KLOSE (p. 675) refers to outbreaks of typhus, in German prison camps, under conditions which preclude the possibility of infection by the bites

of lice. The only possible vehicle for the Rickettsiae is the faeces of infected lice, but further research is needed to show whether the infection is conveyed through the skin, by inhalation, or by "smear infection." He emphasizes the necessity for the use of disinfectants on the skin and for the sterilization of clothing and bedding. LIEBAU (p. 755) describes the onset of typhus in a military medical officer not exposed to lice. He presumes that the patient contracted his infection from blood while taking specimens for the Weil-Felix reaction; he terms this "blood-smear infection." [It is a point worth bearing in mind by medical men called upon to deal with typhus, see WALTHER above.] DORMANNS and EMMINGER (p. 824) report a case of typhus due to transfusion of blood from a person incubating the disease; the incubation period in the recipient of the blood was 11 days.

FINDLAY (p. 367) gives an account of the laboratory methods used in the investigation of typhus, commenting on diagnostic procedures, specific treatment and methods of vaccination.

In the *Monthly Bulletin, Emergency Public Health Laboratory Service* (p. 821) is an account of the reactions to *Proteus OX19*, *OX2* and *OXK* of 100 sera from persons not suspected of typhus, in England. Positive results occurred in low titre in a large number of cases, but it is held that agglutination at titres above 1/64, after four hours' incubation at 50°C., are unlikely except in typhus. BUCHWALD (p. 137) has tested the Weil-Felix reaction of 300 sera from persons known to be free from suspicion of having had typhus. A considerable number of sera gave indefinite results, showing flocculation visible only with the agglutinoscope. Thirty-six gave definitely positive reactions to *Proteus OX19* or *OX2* in dilution of 1 in 25, but only two gave positive results at 1 in 50. No positives were obtained with *Proteus OXK*. In comment MEGAW points out that it is necessary to know if sera which give positive results at those titres would show rising titres during attacks of typhoid or other non-Rickettsial fevers.

SEIFFERT (p. 611) defines the typhus infection index as the percentage of persons in a community who react to *Proteus OX19* in titres of 1/100 and over. In making a survey children are the best subjects because they frequently suffer from attacks which may easily be missed. He reports the results of a survey of German soldiers and Russian prisoners, and notes that mild cases of the disease were found which would hardly have been detected by other means.

STEUER (p. 372) describes the technique of the dry-blood agglutination test for typhus, the enteric group of fevers, and the dysentery group. This consists of taking drops of blood which are allowed to dry on a slide (and which may then be kept for several days if necessary), and adding to them suspensions of the organisms relating to the different tests. Agglutination is readily detected. The results are claimed to be worthy of serious consideration and the method has been applied, with success, to the detection of these diseases in large groups of people. Extensive surveys can quickly be made. The same author (p. 676) has used the dry-blood agglutination test, with a suspension of *Proteus OX19*, for surveys of the population in Poland. He has found that this test is usually positive in typhus, but its importance lies in the detection of ambulatory cases or of symptom-free carriers, who would otherwise probably pass unnoticed. Some of these persons had had mild fever, or had merely felt unwell; others had no symptoms of any kind except a rash. Children especially suffer from mild and unrecognized attacks of typhus. If these mild cases are

detected, wide surveys should be made, not only of contacts but also of the general population, and the subjects of mild attacks should be thoroughly deloused; they usually harbour infected lice. It is not known whether lice which feed on persons with mild attacks become as intensively infected as those which feed on heavily infected patients.

VEINTEMILLAS (p. 141) describes a rapid test for typhus, which consists of the agglutination of a suspension of Proteus, coloured with methylene blue, by the serum or blood of the patient. One drop of each reagent is used and the test is performed on a glass slide; in essentials the test is the same as that originally described by WELCH and modified by CASTAÑEDA.

HALLMANN (p. 678) describes a rapid bedside test for typhus which is essentially the same as that already reported by VEINTEMILLAS above. GROOT *et al.* (p. 678) discuss the laboratory methods used in the diagnosis of typhus in Nariño (Colombia); a rapid slide test is used with *Proteus OX19* or with suspensions of Rickettsiae. The latter test usually gives earlier and stronger positive results.

JACOBI and DÖRSCHEL (p. 754) note that positive results with the Weil-Felix reaction are almost always obtained after five days (sometimes after three) in typhus, and state that the dry blood test is equal to the standard test. They discuss the early signs which may be found, and the other diseases from which typhus must be differentiated.

CALDER (p. 366) has found positive results to the Weil-Felix reaction (*Proteus OX19*) in a considerable number of cases of brucellosis and points out that mistakes in diagnosis may be made unless it is remembered that ascending titres against Proteus are found in typhus but not in brucellosis. A similar note is made by FINDLAY (p. 367).

GROMASHEWSKIJ (p. 141) has failed to obtain evidence that the blood is infective for animals later than one day after the end of the fever in typhus, though positive results were found during the febrile period and, in one instance, two days before the onset of the disease. From these tests and from a study of the literature he draws the conclusion that there is no evidence of the existence of healthy carriers of the organism, or of inapparent infection. [This conclusion is at variance with the views of many other workers at the present time.]

In a discussion of the outbreak of typhus which occurred in 1938–39 in the Ukraine, CHASOVNIKOV (p. 142) remarks that, although other workers have reported cases in which no rash was observed, he has not seen any case which has been confirmed in which this cardinal symptom was absent [this again is an opinion not universally shared]. He describes the measures taken to control the disease in rural communities.

MRUGOWSKY (p. 541) dwells on the variations in the clinical picture observed in cases of typhus in Central Europe; symptoms often suggest other diseases such as influenza, acute pharyngitis, appendicitis, polyarthritis or nephritis. There is often an intermission of fever, lasting a few hours, between the fourth and seventh days. LUZ (p. 542) reports similar findings and states that in 16 mild cases no rash appeared [compare CHASOVNIKOV above].

LAMPERT (p. 824) describes a severe outbreak, in guards at a prisoner-of-war camp in Poland, which occurred in spite of control measures; the fatality rate was 25 per cent., but if 35 vaccinated persons are excluded, it was 35 per cent. There were no deaths in the vaccinated patients, though some had received only one dose. Two patients had neither fever nor rash, but the Weil-Felix reaction was positive. This

reaction, however, was negative in three undoubted cases, and it is noted that it is, in general, of no significance in prognosis. A second, but milder, outbreak is described in soldiers returned from the Russian front. The authors consider that their method of treatment (hot baths, transfusions of blood substitute and Ringer's solution) may have been responsible for the mildness of the disease in this outbreak, but MEGAW, in comment, suggests that, in view of the long incubation period, it was probably an infection of low virulence.

MUNK (p. 369) lays stress on the very low blood pressure which is a feature of severe typhus and which may be a factor in the production of gangrene of the skin. In treatment he advocates the use of digitalis, caffeine, intravenous glucose and subcutaneous adrenalin.

WETZEL (p. 367) describes acute glomerulo-nephritis in typhus, and insists that renal damage has not sufficiently been emphasized in the literature.

WALTHER (p. 542) has seen recurrence of slight fever during convalescence from typhus, together with urticarial symptoms which he attributes to an allergic state.

Suspensions of lungs of mice heavily infected with *R. prowazeki* or *R. mooseri* contain enormously more infective doses than infected guineapig brains. DURAND and BALOZET (p. 543) have used lung suspensions for the inoculation of horses to produce curative sera. These sera have proved effective in prevention when mixed with infective material before injection intradermally into animals, but their curative action remains to be judged by therapeutic tests in man. It is noted that the Weil-Felix titres do not correspond with the results of intradermal tests. These authors (p. 369) describe the results obtained from the treatment of typhus with serum from horses inoculated with Rickettsiae of murine and epidemic strains. This serum was used in 120 patients and there were 140 controls, but the treated patients included only those who had not been ill for more than 10 days. It was sometimes difficult to get the history of a patient whose mental condition was seriously affected, and, as MEGAW points out in comment, this may have led to the inclusion of fewer severe cases in the treated group than in the controls. The results, as they stand, indicate that serum treatment reduces the case mortality rate, and tends to shorten the disease in the indigenous population of Tunisia, where the experiment was carried out, but it did not reduce the incidence of pulmonary complications. The few Europeans treated did not show appreciable benefit. In *Public Health Reports* (p. 611) there is a note that in Algeria injections of sera have given good results. [These sera may have been those described above.]

VAN MEERENDONK (p. 679) reports good results from treatment with atebrin combined with plasmoquine, especially in older persons. If no benefit was obtained it is stated that there was usually a complicating bronchopneumonia, which yielded to intravenous sulphapyridine. MENK (p. 452) has used sulphapyridine in the treatment of typhus, but although it appears to have a beneficial affect on the secondary bacterial pneumonia which occurs, there is no evidence that it influences the typhus itself. WOHLRAB (p. 826) writes unfavourably of the sulphonamides in typhus, except in the treatment of complications.

MACKENZIE (p. 370) deals with the control of louse-borne typhus. He emphasizes the part played, in times of epidemics, by great movements of people, by which the non-immune may be brought into

endemic areas, and the importance of famine as a predisposing factor. Diagnosis, especially of the first cases, may present difficulty, but it is helpful to remember that the rash rarely affects the face, and that it does not appear in crops ; in mild cases and in children there may be no rash. The best means of diagnosis is by the Weil-Felix reaction, which shows a rising titre, but often this does not occur in the first week. Protection of the medical staff is important, and protective clothing and good nourishment are essential. Masks and goggles should be worn to prevent infection by dried louse faeces. For the infected population, general delousing is more effective than search for remote contacts, and the author gives advice as to the administrative measures which should be taken in controlling large epidemics in this way.

TUCKER *et al.* (p. 145) describe an outbreak of typhus of murine origin in Nashville, Tennessee, noting that the disease appears to be spreading from the Atlantic coast to the interior. In all cases the patients were associated with rat-infested buildings. They note that the rash could seldom be detected in negroes and was absent in two white patients. BOSTON (p. 377) remarks that the murine form of typhus is increasing in Georgia, U.S.A., where it is becoming a major public health problem. Control by complete rat-proofing of buildings, though the ideal method, is often impracticable, and he writes of the value of " vent stoppage ", by which rats are prevented from entering the buildings. This stoppage is achieved by the use of galvanized metal sheets, galvanized wire cloth of ½ inch mesh, bricks and cement. When stoppage has been completed, trapping and poisoning of rats already inside is carried out ; garbage control is effected.

HUGHES and BALDWIN (p. 756) report two cases of typhus, which they judge to have been of murine origin, in Lagos. CECCALDI (p. 375) reports the murine form of typhus in man from Brazzaville in French Equatorial Africa, and notes that a case of boutonneuse fever occurred there in 1938.

HEILIG and NAIDU (p. 375) report four cases of a fever of the typhus group in Mysore city ; they regard the disease in these cases as of murine origin. In comment, however, MEGAW points out that the evidence obtained, from the histories, serum reactions and clinical findings, should not be held definitely to exclude the tick-borne form of disease, and remarks on the difficulties which may be experienced in such differential diagnosis. HEILIG and NAIDU (p. 827) describe more cases of the same kind from Mysore. MEGAW points out that in their clinical and serological features these cases conform closely to tick-borne typhus, but the epidemiological conditions are more in keeping with the flea-borne disease.

WOODHEAD and DUTTA (p. 147) contribute a note on the Weil-Felix reaction in Assam, a country from which there are no records of typhus. Positive results were obtained which led the authors to think that mite, flea, and tick typhus were present in the community. SONI (p. 614) reports three cases of shop typhus (presumably of murine origin) in Burma.

JOCSON (p. 376) reports several sporadic cases of typhus from the Philippines ; in comment MEGAW argues that they were probably of the murine type.

CASTAÑEDA and SILVA (p. 151) consider that there is considerable immunological overlapping between Rocky Mountain fever and epidemic or murine typhus [but see VEINTEMILLAS below]. Animals which had recovered from infection with epidemic or murine strains

showed high resistance to Rocky Mountain infection, compared with controls, and sera from patients with Rocky Mountain fever agglutinated *Proteus X19* and *Rickettsia prowazeki*.

BENGTSON and TOPPING (p. 146) have investigated the complement fixation reaction in endemic typhus in the United States, using as antigen a strain of Rickettsia recovered from a wild rat and grown in yolk sac of chick embryos. The test is positive at titres of 1 in 16 to 1 in 1,024 in most proved cases, but in those in which the disease occurred 2–3 years previously the titre was 1 in 4 to 1 in 8. Negative results are given in other diseases, and the authors conclude that the test is specific for endemic typhus. These authors (p. 539) have found that the titre of the complement fixation test in endemic typhus of murine origin rises more slowly than that of the Weil-Felix reaction, but may persist considerably longer. The complement fixation test is of considerable value in differentiating between endemic typhus and Rocky Mountain fever in America, when the Weil-Felix may not be useful for that differentiation. In Rocky Mountain fever the latter test may be strongly positive, or only very feebly so; in endemic typhus it is much more constant. [See also PLOTZ and WERTMAN, below.]

FITZPATRICK and HAMPIL (p. 674) record experiments in rabbits which suggest that Rickettsial agglutinins, in Rocky Mountain fever and in louse-borne typhus, appear in the blood earlier, and persist longer, than the Weil-Felix response; they are more specific and are correlated with the presence of protective antibodies. In natural human Rocky Mountain fever there is the same persistence of Rickettsial agglutinins at the time when the Weil-Felix response is diminishing or has disappeared. It remains to be seen if the Rickettsial agglutinins in man appear earlier than the positive Weil-Felix test.

VACCARO and PERFETTI (p. 752) report on the Weil-Felix reaction in Valparaiso; *Proteus OX2* was more frequently agglutinated than *Proteus OX19*, and *Proteus OXK* only in association with positive results to one of the others. The significance of the reactions to *OX2* and *OXK* is difficult to assess.

SPARROW and MARESCHAL (p. 543) have injected living suspensions of the intestines of lice infected, by Weigl's method, with a murine strain of Rickettsia into young persons suffering from conditions requiring pyretotherapy. Injection of one louse intestine caused sharp local reaction and a febrile attack lasting 6–10 days, but with a rash in only one of four subjects. Doses of 1/100 of a louse intestine caused inapparent attacks; doses of 1/1,000 or less failed to provoke any reaction. Instillation into the conjunctival sac caused milder attacks, with longer incubation periods, than injection. It was found that full immunity was provoked in those whose Weil-Felix reaction became positive, even if the attacks were inapparent. SPARROW (p. 544) has shown that the intestines of lice infected with a murine strain, by Weigl's method, are extremely rich in Rickettsiae, and that with small infecting doses rats and guineapigs suffer mild attacks, but acquire solid immunity.

BRIGHAM (p. 146) has isolated two strains of murine virus from the chicken flea *Echidnophaga gallinacea* in Georgia. Rats and *Xenopsylla cheopis* and *Leptopsylla segnis* were also infected. ALICATA (p. 614) has infected the sticktight flea *Echidnophaga gallinacea* by allowing it to feed on rats infected with murine typhus. Emulsions of fleas injected into guineapigs produced the disease.

SNYDER and ANDERSON (p. 374) note that the cotton rat *Sigmodon hispidus hispidus* is susceptible to louse-borne typhus, and is a suitable animal for laboratory work; it is not so susceptible to the murine type.

Proteus OXK type: Vector: mite.

GISPEN (p. 147) has found the chorio-allantoic membrane of the duck egg to be suitable for the cultivation of Rickettsiae of mite-borne typhus, which cannot be grown in the hen's egg. These egg strains show no loss of virulence. The fact that by this technique the Sumatran strains cannot be distinguished from those of scrub typhus supports the view that the organisms are identical [an opinion previously stated by LEWTHWAITE and SAVOOR].

REYNES and RICHARD (p. 377) describe a case of mite-borne typhus in which severe general nervous symptoms were followed by wasting of the muscles of one shoulder. Recovery was complete. It was noted that in addition to the Weil-Felix reaction the Kahn test became positive and remained so for two months, but there was no other evidence of syphilis.

DAMMIN and BILLINGS (p. 822) have investigated the serological reactions of persons infected with species of Proteus; in general these infections tend to cause agglutination in high titre of *Proteus OXK*, but not of *Proteus OX19*.

Indeterminate type. Vector: tick.

TOPPING (p. 148) produces evidence which disposes of the theory that Rocky Mountain fever is less virulent in the eastern than in the western States of the U.S.A. In both regions the strains of Rickettsiae may be mild or virulent, whether judged by animal experiment or by the reaction of human beings to the disease. He (p. 379) has isolated a strain of the Rickettsia of Rocky Mountain fever from Wyoming, which showed the lowest virulence of any yet studied; it gave complete cross immunity with highly virulent strains of the Rocky Mountain type, but not with Rickettsiae of Q fever. The author suggests that the geographical classification into eastern and western types should be abandoned and that strains should be classified on their virulence to guineapigs; he states that there is no justification for the view that strains transmitted by *Dermacentor variabilis* are milder than those conveyed by *D. andersoni*. HUTTON (p. 150) also notes that the case mortality rates of the eastern and western types of Rocky Mountain fever are practically equal.

PLOTZ and WERTMAN (p. 680) describe their method of preparing an antigen of a suspension of Rickettsiae, which they used for the complement fixation test in Rocky Mountain fever. This test gave positive results with sera from patients who were recovering or had recovered from that disease, but not with sera from patients with other fevers, including Brill's disease and Q fever, or from normal persons. It therefore appears to be specific and should be valuable in differentiation [see also BENGTSON and TOPPING, above].

LILLIE (p. 149) contributes a careful description of the pathological findings in fatal cases of Rocky Mountain fever. These cannot be further summarized; they are essentially the same in man and in *rhesus* monkeys.

BRUMPT and DESPORTES (p. 829) have shown that the Rickettsiae of Rocky Mountain fever and of São Paulo fever may survive 4½ and 5 years respectively in *Ornithodorus turicata.*

PATIÑO-CAMARGO (p. 378) describe a new focus of tick-borne typhus of the Rocky Mountain type in Tobia, Colombia, the previously known foci being in the United States and Canada, and in Brazil. The natural vector is *Amblyomma cayennense,* but several species of Dermacentor and Ornithodorus, from North and South America, were proved to be potential vectors. Sera from some of the patients showed protection against Rocky Mountain strains, others did not. The Weil-Felix reaction was positive, but not at high titre. Further cross immunity investigations are in progress. MANRIQUE & MONTOYA (p. 615) have found a new focus of fever, of the type of Rocky Mountain fever, in Santander, Colombia. Cross immunity tests showed that the strains isolated were identical with those of Rocky Mountain fever and the spotted fever of Tobia and São Paulo. [Louse-borne typhus also exists in Colombia, see GROOT above.]

TOSTES and BRETZ (p. 453) have found spotted fever (of the tick-borne type already known in São Paulo and Minas Geraes) in a rural area near Rio de Janeiro. Blood from the patients gave scrotal reactions and appearances typical of Rocky Mountain fever when injected into guineapigs. *Proteus OX19* was agglutinated in 5 of 6 cases, to a moderate titre.

DE MAGALHÃES (p. 828) discusses the epidemiology of this disease. Although the chief vector is *Amblyomma cajennense,* he suspects that the bedbug may be capable of transmission in nature as they have been proved to be experimentally. Mosquitoes, fleas, lice and the tick *Boophilus annulatus* var. *microplus* have been excluded as vectors. He mentions the animal reservoir hosts. DE MAGALHÃES and MOREIRA (p. 545) bring out certain important points in a description of the tick-borne typhus of Minas Geraes. The principal vector is believed to be *Amblyomma cajennense* [and it will be remembered that de Magalhães has previously shown that certain animals, dogs, opossums, foxes, bush rabbits and other rodents may act as reservoirs in nature]. The present note is concerned chiefly with clinical appearances. Mild, ambulatory forms have been proved to occur, but cases of average severity are common, and grave forms, which may show a great variety of forms, are described. In general, the symptoms resemble those of Rocky Mountain fever.

DE MAGALHÃES (p. 151) gives an account of the clinical laboratory findings in cases of the tick-borne typhus of Minas Geraes. The details cannot further be summarized. The same author (p. 152) writes of the value of inoculation of guineapigs with blood from the patients ; in positive cases the animals respond with typical fever and scrotal reaction, and he claims that a negative animal test excludes this fever.

GEAR and DE MEILLON (p. 152) have proved hereditary transmission of the Rickettsia of S. African tick-bite fever, in the tick *Haemaphysalis leachi,* to the fourth generation. They presume that hereditary transmission may continue indefinitely ; larvae, nymphs and adults were infected, and adults probably remain infected for long periods. NEITZ *et al.* (p. 757), however, point out that there has been little definite evidence to incriminate the ticks suspected of transmitting South African tick-bite fever. *Hyalomma aegyptium* has been proved a vector and *Haemaphysalis leachi* has been infected, but the method commonly adopted, of inoculating animals with the tissues of crushed

ticks, does not prove them to be vectors in nature. The authors have shown that *Rhipicephalus sanguineus* can transmit the disease naturally, and that larvae bred from infective ticks are also infective.

VIOLLE and JOYEUX (p. 379) have found Rickettsiae in the blood of rabbits, and from *Rhipicephalus sanguineus* infesting the rabbits, in the region of Marseilles. Tests of these Rickettsiae were not conclusive, but it is assumed that they were the Rickettsiae of boutonneuse fever ; if this view is true, it seems that wild rabbits, as well as dogs, may be a reservoir of the disease.

Q fever.

FINDLAY (p. 380) has produced pneumonitis in mice by the intranasal instillation of suspensions of the spleens of mice infected with Australian and American strains of *Rickettsia burneti* of Q fever. A description of the pulmonary changes is given ; the condition was rarely fatal, but otherwise was essentially the same as that induced by instillation of the Rickettsiae of classical and murine typhus. Rickettsiae were found in large numbers in the lungs. The findings resembled those recorded in a fatal human laboratory infection with Q fever which occurred in Washington.

In describing the pathological effects of the Rickettsia of Q fever in animals, LILLIE (p. 548) notes that small foci are found in the lungs but that lesions in the brain and spinal cord are very infrequent. He contrasts this finding with the effects seen in classical typhus and Rocky Mountain fever infections of animals.

PERRIN and BENGTSON (p. 830) describe the pathology of Q fever in mice. They point out that, since the intranasal inoculation of normal yolk-sac material into mice produces pneumonia in a proportion of instances, the appearance of pneumonia after inoculation of suspected material is not, in itself, evidence of the presence of Rickettsiae.

Vaccination.

DYER (p. 453) discusses vaccination against louse-borne and flea-borne typhus, and gives a brief description of the methods of preparation used by the various workers.

COX (p. 381) gives full details of his method of preparing vaccines against various diseases of the typhus group. The Rickettsiae are grown in the yolk-sac of hens' eggs, and the vaccines are made from virulent strains which have been passed through 40–50 yolks with several transfers through guineapigs. On death of the embryos the embryonic tissues are suspended in saline containing phenol and formalin and various centrifugation and dilution procedures are carried out. About 1 litre of this vaccine of killed Rickettsiae can be prepared from 200 eggs. Potency tests are carried out in guineapigs. The vaccine has been issued for use in certain countries subject to epidemic typhus, but its efficacy had not, at the time this paper was written, been fully assessed.

The Report of the Health Commission of the Rockefeller Foundation for 1940–41 (p. 140) contains an account of the outbreak of typhus in Spain. It is noted that the Cox vaccine was used on a fairly large scale and that the opinion held of it by the Madrid health officials was good, but that it did not prevent the onset of mild typhus in five laboratory workers thought to be adequately protected.

GILDEMEISTER and HAAGEN (p. 681) have prepared vaccines by methods similar to those used by Cox, but have not yet tested them in man. They point out that no vaccine can be expected to afford complete protection, since that it is not always achieved even by an attack of the disease. They emphasize the risks to which laboratory workers are subjected, and the measures of protection these persons should adopt. Details of the difficulties encountered in preparation of vaccines of *R. mooseri* and *R. prowazeki* are given ; the method should be compared with that of Cox.

WOHLRAB (p. 547) in discussing vaccination, states that experiments with live vaccines have not produced practical results. Weigl's vaccine has proved its value in Poland and elsewhere, and since the Cox vaccine has certain disadvantages, the use of the Weigl method must be continued. He remarks that pooled convalescent serum has proved ineffective in Poland. HETSCH (p. 548) gives his opinion of the Weigl and Cox vaccines in much the same sense.

FINDLAY (p. 383) reports two cases in which injection of vaccines of epidemic typhus Rickettsiae failed to prevent infection with murine strains in persons working with those strains, though in one case the attack was mild and was probably modified by the vaccination. He concludes that there is probably a close antigenic relationship between Rickettsiae of epidemic and murine typhus, which is quantitative rather than qualitative. He reviews the various vaccines which have been used ; the duration of immunity from killed vaccines is probably not more than one year. He notes that both Weigl's vaccine and the mouse lung vaccine lose much of their antigenic power after 5–6 months, even when kept in the ice chest.

EYER *et al.* (p. 385) report 15 laboratory infections in persons engaged on preparation of Weigl's vaccine. All the patients had received one or more injections of the vaccine, but in their work opportunities occurred for heavy infection either through the feeding of infected lice or the inhalation of infected louse faeces. In view of the heavy infecting doses these persons must have received, the authors conclude that the vaccinations they had undergone had conferred a considerable degree of immunity ; they also hold that the efficacy of the vaccine has been established by large-scale trials in the field.

GEAR and DAVIS (p. 750) show that gerbils of S. Africa (*Tatera brantsi* and *T. afra*) are susceptible to louse-, flea-, and tick-borne typhus, and that after exposure of the animals to X-ray and intraperitoneal inoculation of infective material, very rich growths of Rickettsiae are found. These are the animals of choice for obtaining large quantities of Rickettsiae. GEAR *et al.* (p. 830) have followed up this work by preparing vaccine of *R. prowazeki* from the peritoneum of irradiated gerbils, by the Zinsser-Castañeda method. Formol-saline was used as the diluent. This vaccine produced immunity in animals ; in man it produced slight local, but no general, reactions.

HUDSON (p. 153) reports good homologous protection in animals after vaccination with a phenol-killed Rickettsia obtained from the lungs of white rats infected with a Mexican strain, according to the technique of Castañeda.

VEINTEMILLAS (p. 153) discusses vaccination against the " altiplanic " (louse-borne) typhus of Bolivia. He states that there is no cross immunity between this fever and Rocky Mountain fever [but compare CASTAÑEDA and SILVA above]. Blanc's live murine vaccine was not satisfactory, but large doses of killed murine Rickettsiae, prepared by

the Castañeda technique from the lungs of infected rats or white mice, gave sound immunity, in animals and man, against the altiplanic strains. The author emphasizes that to secure good immunity the Rickettsia content of the vaccine must be high. The parent preparation contains over 100 million per cc., and two or three doses, of 1–2 cc. of 1 in 10 dilutions, are given at intervals of 1–2 weeks.

GIROUD and PANTHIER (p. 753) have produced abundant supplies of the Rickettsia of louse-borne typhus by intranasal inoculation of mice with material from the exudate of the tunica vaginalis of infected guineapigs. After repeated intraperitoneal passage of this strain in guineapigs its virulence diminished; the same result was found after prolonged storage or refrigeration. Vaccination of animals with formolized suspensions of infected lungs was successful, and similar results were obtained with vaccines made from the lungs of rabbits infected intranasally, but only if the lungs contained Rickettsiae. The authors describe the morphology of the Rickettsiae; the only virulent forms are said to be those described as bacilliform.

DURAND *et al.* (p. 546) show that the Rickettsiae of Rocky Mountain fever, when inoculated intratracheally into mice and rabbits, gave rise to pulmonary consolidation with the abundant production of Rickettsiae if the strains used were fully virulent. If the strains were only moderately virulent the results were less striking, and resembled those obtained with the Rickettsiae of classical typhus. DURAND and GIROUD (p. 546) have produced a vaccine from the lungs of animals infected intratracheally. The Rickettsiae are killed with formaldehyde and the vaccine produced a high degree of protection in guineapigs.

Trench fever.

JACOBI (p. 758) describes an outbreak of trench fever in the German army on its eastern front and gives in detail the signs and symptoms noted. No information is given as to the condition in which this outbreak occurred. It is noted that in the absence of serological tests there may be confusion with brucellosis.

PECHTEL (p. 386) reports a good result from the use of sulphapyridine in trench fever, and PEÑA YAÑEZ (p. 386) writes of the value of tartar emetic in this disease. *Charles Wilcocks.*

MALARIA.

SIEGFRIED (G.) & IZAC (R.). Le paludisme dans l'annexe de Laghouat. [**Malaria in Laghouat.**]—*Arch. Inst. Pasteur d'Algérie.* 1940. Sept. Vol. 18. No. 3. pp. 279–294. With 1 map & 4 figs. on 2 plates.

The Laghouat area, some 6,750 square miles in extent, is about 250 miles due south of Algiers, along the southern foothills of the Atlas Mountains. Administratively it is part of the Ghardaia Military Territory. It is traversed from west to east by the Mzi Wadi, which contains water throughout the year in its western half; the eastern part of the wadi is generally dry, except in time of flood. The population is 34,000, of whom 20,000 are nomad Arabs. The settled population are mostly found north of the Mzi Wadi, where the climate is more

humid than in the southern part, which forms part of the north Sahara. The town of Laghouat, a fine oasis with 35,000 palm trees, at the foot of the Atlas mountains and on the very edge of the desert, is the administrative headquarters. It has a settled native population of 8,525. Malaria is very little in evidence in normal years anywhere in the Annex. Nomad Arabs may contract the disease elsewhere. Laghouat town has no endemic malaria. In other less important oases outbreaks have occurred, but very infrequently. In 1939 there was an epidemic of *P. vivax* malaria of some intensity at Cherguia, a small community numbering 100, on the left bank of the Mzi Wadi, 12 miles from Laghouat. *Anopheles hispaniola* was found breeding in a spring, but only very few larvae were taken. The year 1939 was characterized by exceptionally heavy rainfall throughout Algeria, and malaria was abnormally prevalent. *Norman White.*

PARROT (L.), CATANEI (A.) & AMBIALET (R.). Observations parasitologiques sur le paludisme en Algérie. II. Le paludisme épidémique. [**Parasitological Observations on Malaria in Algeria. II. Epidemic Malaria.**]—*Arch. Inst. Pasteur d'Algérie.* 1940. Dec. Vol. 18. No. 4. pp. 402–440. With 12 diagrams. [Refs. in footnotes.]

The observations reported concern a population of 789 people of an Arabic speaking white race living in the neighbourhood of Constantine. They are almost exclusively engaged in agriculture. The locality has long had an unenviable reputation for malaria; in 1934 the spleen index of children of 15 years and under was 80 per cent. The grassy banks of the Rhummel River, and numerous canals and irrigation ditches afford breeding facilities in abundance for *A. maculipennis* var. *labranchiae.* During 1939 there was an excessive prevalence of malaria: every member of the community was submitted to blood examinations twice a month from June to November and once in May and once in December. One blood smear and three thick drops were made at each examination. The results of the examination of this large mass of material are the basis of an extremely interesting and detailed report. Of the total population 39·6 per cent. were found to harbour parasites; 27 per cent. were infected with one species of parasite, 11 per cent. with two, and 1·2 per cent. with three species. The parasite index was about three times greater for the age groups 15 and under than for adolescents and adults. Half the infants were infected during the first year of life. *P. falciparum* was the most prevalent species at all ages. Monthly variations of parasite indices were studied and use was made of a new "plasmodimetric" index. To establish this index the intensity of the infection is estimated. The blood examined is placed in one or other of the following 6 categories:

Category 1—parasites very rare in thick drops, not more than 1 in a smear.

Category 2—parasites rare; several parasites found in thick drops but less than 1 in 5 fields of the smear.

Category 3—parasites infrequent; 1 parasite in 5 fields of the thick drop and in 20 fields of the smear.

Category 4—parasites numerous; more than 1 in 5 fields of the thick drop; 1 parasite in 10 fields of the smear.

Category 5—parasites very numerous; at least 1 parasite in each field of the thick drop; more than 1 parasite in 10 fields of the smear.

Category 6—parasites extremely numerous; several in each field of the smear.

Supposing in any given month 161 examinations of children 0 to 15 years of age gave 34 positive results divided thus:—

Category or coefficient	5 :	1
,, ,,	4 :	5
,, ,,	3 :	5
,, ,,	2 :	12
,, ,,	1 :	11

then the monthly intensity of malaria parasitism for this group would be:—

$$\frac{(1 \times 5) + (5 \times 4) + (5 \times 3) + (12 \times 2) + (11 \times 1)}{34} = \frac{75}{34} = 2{\cdot}2$$

The parasitological indices showed that *P. falciparum* was chiefly responsible for the epidemic outbreak and that premunition gives a much shorter and less effective protection against *P. falciparum* than it does against either *P. vivax* or *P. malariae*. It was also noted that the proportion of *falciparum* gametocyte carriers, normally low in periods of low transmission, increased considerably during the epidemic. The proportion of *P. vivax* and *P. malariae* gametocyte carriers remained almost unchanged. Mixed infections became more numerous as the epidemic progressed. *Norman White.*

COLLIGNON (E.). Observations sur le comportement des anophèles en Algérie pendant l'année 1940. [**Behaviour of Anopheles in Algeria during 1940.**]—*Arch. Inst. Pasteur d'Algérie.* 1941. June. Vol. 19. No. 2. pp. 265–272. With 8 figs. on 4 plates.

In contrast to the previous year rainfall in the spring of 1940 and in the preceding winter was markedly deficient. Surface collections of water were fewer than usual and rapidly disappeared. Marshy lands were much restricted. The mild winter, however, gave anophelines a good start. Larvae of *A. bifurcatus* were taken February 27th, *A. algeriensis* March 6th, *A. maculipennis* March 7th and *A. hispaniola* May 1st. *A. maculipennis* was found breeding throughout the malaria season and is the most widely diffused species. The last larvae of *A. bifurcatus* were found on May 30th. *A. algeriensis* larvae could be found in certain restricted, well-shaded breeding places till the 3rd of August, when the last specimen was taken. *A. marteri* was found breeding in the hills in March; it is of no malarial importance. The capture of adult anophelines was difficult in the spring; they became numerous in June but diminished almost to vanishing point in July under the influence of the sirocco. Their prevalence remained low.

Norman White.

COLLIGNON (E.). La campagne antipaludique de 1940 dans le département d'Alger. [**Antimalaria Campaign in Algeria in 1940.**]—*Arch. Inst. Pasteur d'Algérie.* 1941. June. Vol. 19. No. 2. pp. 273–286. With 8 figs. on 4 plates & 3 graphs.

Malaria was mild in Algeria in 1940. The expected large number of relapses in the spring following a year of unusual malaria severity did not materialize. Primary infections were not numerous and cases of a

grave clinical type were confined to a few unhealthy localities. *P. vivax* was predominant throughout the year. The usual predominance of *P. falciparum* in late summer and early autumn was not observed. This was all due to a degree of Anopheles prevalence much lower than usual. The use of prophylactic quinine was confined to populations living in areas of high endemicity. Antilarval measures, the training and tidying of water courses, and oiling, were carried out in spite of difficulties in the recruitment of personnel arising from war conditions. Once again considerable use was made of Gambusia. In protected areas the improvement in health conditions was more marked than in other localities where the improvement was due solely to more favourable epidemiological conditions. *Norman White.*

BOULNOIS (J.). Contribution à l'étude de la prémunition des noirs africains contre le paludisme algérien. [**Contribution to the Study of the Premunition of African Natives against Algerian Malaria.**]—*Arch. Inst. Pasteur d'Algérie.* 1941. Mar. Vol. 19. No. 1. pp. 37–40.

During 1939 a French battery, with a personnel of 134, of whom 40 were Algerian natives, Arab or Berber, and the remainder European, was quartered in the neighbourhood of Bone. Scarcely a single individual escaped one or more attacks of malaria. Alongside and in exactly comparable condition was a section of Senegalese troops; the men had been recruited in the Ivory Coast and in French Guinea. No antimalarial precautions of any kind were taken, in spite of very great anopheline prevalence. Not a single case of malaria occurred among these Senegalese troops throughout the year, though complaints about incessant attacks by mosquitoes were unceasing. *Norman White.*

CLASTRIER (J.). Sur une épidémie de paludisme observée à Msila (Département de Constantine). [**Malaria Epidemic at Msila, Department of Constantine.**]—*Arch. Inst. Pasteur d'Algérie.* 1942. Mar. Vol. 20. No. 1. pp. 15–32. With 8 plates & 2 figs.

Msila is a small town of some importance lying astride the Ksob Wadi, midway between Bordj Bou Arreridj and Bou Saada. The native population is about 7,500; there are some 225 Europeans. Up to 1938 Msila had always been considered a healthy place. There had been very little malaria except for an outbreak of some severity during the war of 1914–18, when a detachment of Senegalese troops were stationed on the outskirts of the town. In 1938 and the two following years malaria cases were more numerous than usual but the death rates from all causes during these years were not abnormally high. In the autumn of 1941, following an epidemic of typhus, an explosive outbreak of malaria occurred. Some 85 to 90 per cent. of the population were attacked. Malarial coma and gastro-intestinal forms of the disease predominated. In October 1941, 221 deaths were registered in Msila, which is more than double the total deaths registered during the whole of 1940. The author of this report carried out an inquiry during the latter half of October. He found that 53 per cent. of 717 persons of all ages had enlarged spleens; that 49·8 per cent. of 387 persons harboured *P. falciparum*, 38·2 per cent. *P. vivax*, and that the parasite

index was 81·6. Gametocyte carriers were 68·7 per cent. of the persons examined. A series of recent floods had flushed the wadi just before the inquiry was carried out; larvae of *A. hispaniola* and of *A. maculipennis* were found in sheltered pools. The latter species alone was found in houses. A further survey in the spring will be necessary for the elaboration of an antimalaria programme.

A large part of the report is taken up with an admirably illustrated description of the wadi and many other less important anopheline breeding places, irrigation channels and ditches. Twelve kilometres upstream a dam has recently been constructed in the Ksob Wadi, and was brought into service in February 1940. What part, if any, the dam played in bringing about an unusual propagation of anophelines it is not possible to determine on the evidence collected. Important factors contributing to the severity of the outbreak concerned the human population. There was marked under-nourishment, which was common to the whole of Algeria but accentuated locally by deficient harvests in two successive years. The outbreak coincided with the fast of Ramadan, a serious complication in an almost exclusively Mussulman population such as this; food cannot be taken and no drugs can be given by mouth between sunrise and sunset. There was an insufficient supply of antimalarial drugs, especially of quinine in a form suitable for injection. *Norman White.*

MESSERLIN (A.). La lutte antipaludique au Maroc en 1941. [**Antimalaria Campaign in Morocco in 1941.**]—*Bull. Inst. Hyg. Maroc.* 1941. N.S. Vol. 1. pp. 133–145. With 1 plate.

Malaria in Morocco in 1941 was characterized by exceptional intensity, comparable with that of 1929 and 1934. The distribution of the epidemic was unusual; its intensity was more or less inversely proportional to the degree of local endemicity. Rainfall in the winter and spring of 1940–41 was in marked excess of the normal. Owing to the spread of the disease to areas in which endemicity is low, the proportion of pernicious attacks was much higher than usual. The epidemic was at its worst along the coast between Mazagan and Safi and in the regions of Settat and of Foucauld (Oulad-Said). The anopheline season started early. Several instances are quoted of the remarkable distances anophelines travelled from the nearest possible breeding place. Thus Oualidia on the coast was invaded by female Anopheles; their breeding places were certainly not less than eight to nine kilometres from the coast.

The organization of antimalaria work in Morocco underwent a great change at the end of 1940. Regional services of hygiene and epidemiology were created and now carry out antimalaria measures. The central antimalaria service has advisory functions only. Considerable difficulties were encountered. Petrol was scarce and many mobile malaria units had to rely on horse-drawn transport. The usual larvicides were unobtainable in sufficient quantity; use was made of calcium arsenite. Quinine was in short supply and had to be used with economy. On the whole the results obtained were fairly satisfactory. Most of the large towns and certain important rural centres that are protected by antilarval work were spared the epidemic. In contrast to this the town of Safi, where no antilarval measures are taken owing to the normally very low Anopheles incidence, suffered severely; the Safi hospital treated 2,325 cases of malaria between July and October,

whereas in previous years the total number of malaria cases treated by this hospital has varied from 30 to 60 a year. In certain selected areas the prophylactic administration of premaline (quinacrine-praequine) was useful, but the results were not as striking as those reported in previous years. *Norman White.*

DUREN (A.). Notes préliminaires sur le paludisme endémique dans la partie Sud du Chenal et dans le Nord du Stanley-Pool, entre Black-River et Kimpoko. [**Preliminary Notes concerning Endemic Malaria in the Southern Part of the Chenal and in the North of Stanley Pool between Black River and Kimpoko.**]—*Ann. Soc. Belge de Méd. Trop.* 1942. Dec. 31. Vol. 22. No. 4. pp. 257–267.

SCHWETZ (J.), BAUMANN (H.) & FORT (M.). Notes préliminaires sur le paludisme endémique sur les rives du "Chenal" du Congo, entre Kwamouth et Black-River. [**Preliminary Notes concerning Endemic Malaria on the Left Bank of the Congo between Kwamouth and Black River.**]—*Ibid.* pp. 269–294. With 1 fig.

In a previous communication TROLLI reported on the results of the examination of thick drop preparations of the blood of all the inhabitants of the villages on the left bank of the Congo from Kwamouth to Stanley Pool, that had been collected by VAN WYMEERSCH during the dry season June and July 1939 [this *Bulletin*, 1943, Vol. 40, p. 213]. These two further reports deal with the examination of thick drop blood preparations of the same population, collected during the rainy season, January and February 1940.

Duren reports on the population of the southern part of this area, which lies on the left bank of the Congo astride latitude 4° S. at an altitude of from 300 to 400 metres. He examined 1,510 thick drop preparations; parasites were found in 883, a parasite index of 58·7 per cent. as compared with 45·56, the index reported by van Wymeersch for the same area. *P. falciparum* was found in 55·8 per cent. of the preparations, *P. vivax* in 0·4, and *P. malariae* in 10·8 per cent. The percentages found by van Wymeersch were 44·7, 0·0 and 3·11. Thus it would seem that the indices are higher in the rainy than in the dry season. Gametocytes were found in 24 per cent. of the preparations. Trypanosomes were found in 13 preparations and microfilariae in 115. *Microfilaria perstans* appeared to be twice as prevalent as *Microfilaria diurna.*

Schwetz and his colleagues report on the northern part of the Chenal from Kwamouth to Black River. The preparations had been made 18 months previously and were consequently difficult to decolorize and to stain. In all 2,597 thick drop preparations were examined. The parasite indices for nearly all the villages were higher than those reported by van Wymeersch, the global index being 56·3 as compared with 45·56 per cent. *P. falciparum* was found alone in 79·7 per cent. of the positive preparations, *P. malariae* alone in 4 per cent. and the two species in association in 15·3 per cent. In almost all cases parasites were very few in number. Gametocytes were found in 45 per cent. of the positive preparations. Trypanosomes were found 13 times and microfilaria 147 times. The detailed results of the examination of the preparations from each of 19 villages are given in tabular form. *Norman White.*

MARTIN (Raymond). Le paludisme autochtone à Addis-Abeba. [**Indigenous Malaria in Addis Ababa.**]—*Arch. Inst. Pasteur d'Algérie.* 1942. Mar. Vol. 20. No. 1. pp. 10–14.

The very considerable literature concerning malaria in Abyssinia that was forthcoming during the Italian occupation was almost unanimous in asserting that endemic malaria in that country was almost confined to altitudes below 1,800 metres, and that transmission never occurred above 2,000 metres. The author considers that these altitude limits of endemic malaria are too low. In his capacity as medical officer of the Djibouti-Addis Ababa Railway Company he frequently observed cases of malaria in which infection appeared to have been contracted at stations higher than 1,800 metres, and also at Addis Ababa, which lies at an average height of 2,500 metres. It was generally assumed that cases of malaria in Addis Ababa were caused by infections contracted during the journey there. The author instances four cases of malaria, three among the native population of the railway concession and one in the native personnel of the French Consulate, in all of which the infection was certainly contracted locally, One of these patients, a child of 5 years, had never left Addis Ababa, and the other three had dwelt there persistently for at least 10 years. Three were *P. vivax* infections and one *P. falciparum*. It is clear then that malaria can be contracted in that city, but it is very difficult to assess the frequency of such locally acquired infections. Adult *A. gambiae* are frequently found in the railway concession of Addis Ababa ; all the year round in poultry runs and stables but rarely in human dwellings except in autumn or spring. They breed in the bed of the Kabana River from mid-September to early November, at the close of the rainy season, but they never appear to breed in permanent collections of water. Many of the more important collections of water contain a curious batrachian *Xenopus clivii*. This frog passes all its existence in water, and the observations of the author show that it is a voracious feeder on mosquito larvae. He never found mosquito larvae in collections of water which harboured this frog.

Norman White.

DE MESQUITA (Bruno). Considerações sobre o impaludismo em Angola. [**Malaria in Angola.**]—*Bol. Geral. de Med.* Bastorá. 1942. July–Sept. Ser. 24. Nos. 7–9. pp. 111–120.

This paper gives the number of cases of the different clinical forms of malaria treated in each of the provinces of Angola during the three years 1938–1940, by age, sex and race, and the malaria mortality among such cases. Seventy per cent. of the total deaths in Angola occur outside the reach of medical assistance. Spleen and parasite indices of all the chief centres of population in the different provinces are listed. Indications for the identification of the chief malaria vectors are given : *A. gambiae*, *A. funestus*, *A. paludis*, *A. pharoensis*, *A. pretoriensis*, *A. obscurus*, and *A. coustani*. The author offers some general remarks regarding the importance of malaria, summarizes the life-history of the malaria parasite, and indicates in tabular form the distinguishing features of the four species of Plasmodia.

Norman White.

CARR (H. P.) & HILL (R. B.). **A Malaria Survey of Cuba.**—*Amer. Jl. Trop. Med.* 1942. Nov. Vol. 22. No. 6. pp. 587–607. With 1 fig. [18 refs.]

A comprehensive malaria survey of Cuba was carried out between 1936 and 1942. The results of the survey in the four Provinces of Oriente, Pinar del Rio, Camaguey and Havana have already been published [see this *Bulletin*, 1940, Vol. 37, p. 664, and 1942, Vol. 39, pp. 513–515]. The present report relates to the island as a whole, summarizes the information contained in the four reports referred to and adds similar information for the remaining two provinces, Matanzas and Santa Clara. Interesting condensed information is given concerning the history, geography, geology, climate and trade and commerce of the Island. Malaria is only mildly to moderately endemic in certain sections of Cuba; large sections are free of the disease. Endemic areas are either near the coast or in the flat alluvial valleys of some of the rivers. The relative freedom from malaria of this tropical island is ascribed to the remarkable porosity of the soil on underlying limestone. Over 99 per cent. of the enlarged spleens of children reached only to the costal margin, or less; over 92 per cent. were palpable only on deep inspiration. It is doubtful whether such palpable spleens have much, or any, malarial significance. Epidemics of malaria do occur in Cuba; 1900–01, 1921 and 1934 were epidemic years. Small, localized epidemics are of more frequent occurrence, and are caused, for the most part, by man-made anopheline breeding places. No naturally infected *A. albimanus* was found, but this widely distributed species is almost certainly the chief vector. *A. crucians* is the only species that was found infected; it prefers animal to human blood but is probably concerned at times in malaria transmission. *A. vestitipennis* can be infected experimentally and has a partiality for human blood; it is a possible vector. Neither *A. grabhami* nor *A. atropos* are of malarial importance. *Norman White.*

ALBERTO ALVARADO (Carlos). Paludismo. [**Malaria.**]—*Bol. Sanitario.* Buenos Aires. 1942. Apr.–June. Vol. 6. Nos. 4–6. pp. 155–166.

In the north-east of Argentina malaria is endemic in the provinces of Jujuy, Salta, Tucumán, Santiago del Estero, Catamarca, La Rioja, Córdoba and San Juan. In the Litoral, on the other hand, epidemic malaria occurs from time to time, with a cyclic periodicity of about 10 years. Epidemic malaria in this zone is an extension of the endemic malaria of Paraguay and of Matto Grasso in Brazil. Such extensions have usually been confined to areas near the river banks, but the outbreak which began in 1939 along the Paraguay River exhibited greater diffusibility and cases of malaria were recorded 100 kilometres from the river. In the endemic area of the north-east the maximum malaria incidence occurs in the early months of the year; the important vector, *A. pseudopunctipennis*, is most prevalent from December to March. In the epidemic zone of the Litoral most malaria cases occur in June and July; a possible explanation of this is the fact that *A. albitarsis* takes refuge in human dwellings after the close of the hot weather. In the endemic zone, where the Director General of Malaria has control of the dispensaries, there was a marked fall in the incidence of malaria in 1941 as compared with previous years. Cases of malaria

registered by the Service fell from 165,000 in 1940 to 134,000. Increased antimalaria activity was responsible for some of the decrease but it is thought that record low temperatures contributed to the decline. In controlled areas there was a much lower prevalence of *A. pseudopunctipennis* than in the previous year.

All three forms of the malaria parasite occur : of the positive findings in the provinces of Jujuy, Salta and Tucumán *P. vivax* was found in 68 per cent., *P. malariae* in 13, *P. falciparum* in 17, and mixed infections in 1·5 per cent. In Catamarca and La Rioja *P. malariae* and *P. falciparum* together were responsible for only 10 per cent. of the positive findings. It is noteworthy that *P. falciparum* infections are unusually mild in the Argentine ; only one death was ascribed exclusively to malaria in 1941. *P. vivax* infections are most in evidence in the last and first months of the year, *P. falciparum* infections in the second quarter and *P. malariae* infections in the third quarter.

Of anophelines other than *A. pseudopunctipennis*, which is much the most prevalent, *A. strodei* has been identified in Tucumán. *A albitarsis* occurs ; it is possible that it is a different race from the *A. albitarsis* of Panama and northern Brazil. The *A. tarsimaculatus* that has been reported is possibly a new variety, or possibly *A. oswaldoi*. These are among the problems that are being studied.

Norman White.

GODOY (Sylvia Garcia). A malaria em São Luís, Maranhão. [**Malaria in S. Luiz.**]—*Folha Med.* 1942. Nov. 5. Vol. 23. No. 21. pp. 228–233.

S. Luiz in the State of Maranhão, Brazil, lies on the coast just south of the Equator. This paper contains a considerable amount of fragmentary information concerning the epidemiology of malaria among a poverty-stricken, parasite-ridden population living in conditions of squalor, but the epidemiological picture is very incomplete. The topography is described and information is given about the hot, humid equatorial meteorological conditions with very heavy rainfall, most of which falls during the first six months of the year. The size of the population is not stated. Of the 1,302 deaths recorded in 1938, 51 were attributed to malaria. These figures for 1939 were 1,257 and 40. Of 1,467 positive blood films examined 936 contained *P. vivax*, 497 *P. falciparum* and 34 *P. malariae*. The spleen index of children of 15 years and under was 33 per cent. The three chief species of Anopheles found were *A. argyritarsis*, *A. albitarsis* and *A. tarsimaculatus*. There is no information as to which is the chief vector, nor as to the breeding places of the different species. Major drainage projects are recommended as the solution of the malaria problem. *Norman White.*

SIVALINGAM (V.). **Seasonal Periodicity of Plasmodia of Malaria at Giriulla, Ceylon.**—*Indian Med. Gaz.* 1943. Mar. Vol. 78. No. 3. pp. 146–147. With 1 chart.

The author paid weekly visits to the outpatient department of the Giriulla Hospital, Ceylon, and made thick and thin blood smears of all patients being treated for malaria. This was done over a period of three years. The number of films examined was 3,889 ; malaria parasites were found in 1,926. The results of these examinations are

presented on a graph which shows the percentage incidence of each of the three species of Plasmodium in each month, as well as the total number of sufferers from malaria attending the out-patient department each month. When the incidence of malaria is low *P. malariae* is most in evidence, 50 per cent. or more of the positive findings. During seasonal or epidemic rises in malaria, *P. falciparum* and *P. vivax* are much more in evidence ; the incidences of these two species fall and rise together. During epidemics *P. falciparum* is the dominant species. An increase in the percentage incidence of *P. falciparum* to 50 heralds a severe outbreak of malaria. *Norman White.*

THOMSON (R. C. Muirhead). **Studies on the Behaviour of** *Anopheles minimus*. **Part VII. Further Studies on the Composition of the Water in Breeding Places and the Influence of Organic Pollution.** —*Jl. Malaria Inst. of India.* 1942. Dec. Vol. 4. No. 4. pp. 595–610. With 3 figs. on 2 plates.

Previous experiments [see this *Bulletin*, 1942, Vol. 39, p. 293] have shown that under laboratory conditions the female of *A. minimus* is deterred from oviposition by a very small degree of pollution and that larvae will develop normally in water far more heavily polluted than the female will accept for oviposition. In this paper the observations have been extended to the field, to find out how the ovipositing female reacts to the kind of organic matter present in natural waters. By using a new analytical method (the oxygen absorbed from *alkaline* permanganate) some information has been obtained about qualitative differences in the organic matter. In general the results support the conclusions reached in the laboratory, and it is suggested tentatively that the upper limiting values which will permit of oviposition are : oxygen absorbed from acid permanganate (Tidy figure) in four hours at 40°C., 6·0 parts per million ; oxygen absorbed from alkaline permanganate, 12 parts per million ; albuminoid ammonia, 1·0 part per million ; "Degree of pollution,"* 8·0 ; and the ratio

$$\frac{\text{alkaline permanganate figure}}{\text{acid permanganate figure}}$$

must not be less than 2·0.

In many stagnant rice fields, and sometimes in tanks and borrowpits, the water contains sufficient organic matter to account for the continuous absence of *A. minimus*. But this does not provide a complete explanation, because there are many other ricefields and collections of stagnant water similarly avoided by *A. minimus*, which have an organic content well within the range tolerated by the female mosquito. Females of *A. hyrcanus* and *A. vagus* will lay eggs in water with an organic content at least twice that of the maximum tolerated by *A. minimus*. Pools of water heavily shaded with Tarapat (a swamp plant used in the control of *A. minimus* by shading) present a special case. The organic content is well within the limits tolerated by *A. minimus*. Perhaps the very low oxygen content is the factor responsible for its absence ; perhaps it is a difference in *quality* of the organic matter which determines the behaviour of the mosquito.

V. B. Wigglesworth.

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* This is an index derived from the empirical formula

$$\frac{(\text{albuminoid ammonia} \times 100) + (\text{Tidy figure} \times 10)}{2}$$

THOMSON (R. C. Muirhead). **Studies on the Behaviour of *Anopheles minimus*. Part VIII. The Naturalistic Control of *A. minimus* in Shallow Earth Wells.**—*Jl. Malaria Inst. of India.* 1942. Dec. Vol. 4. No. 4. pp. 611–614. With 4 figs.

The female *A. minimus* will not lay eggs in water fully exposed to sunlight. This fact has been made use of in order to control the breeding of this species in shallow " kachcha " wells. Where these circular wells, 5 to 6 feet in diameter, with the water level 1 to 4 feet below the surface of the ground, contain clean unpolluted water they may be a prolific source of *A. minimus* in the Assam valley. By removing all vegetation from the water edge, and converting the vertical walls into smooth sloping ones, almost perfect control is brought about without any interference with the water itself. *V. B. Wigglesworth.*

CLARKE (J. Lyell). **Studies of the Flight Range of Mosquitoes.**—*Jl. Econom. Entom.* 1943. Feb. Vol. 36. No. 1. pp. 121–122.

It is a commonly accepted belief that male mosquitoes do not fly far from the breeding places. In order to test this belief and to gain more information about the range of flight of various species, the author selected a flooded marsh in Illinois and dusted the newly emerged mosquitoes on four successive days with different aniline dyes, and then collected mosquitoes in New Jersey light traps stationed at varying distances from 1 to 14 miles away. Of 12,000 mosquitoes so far examined, 72 carried stain. *Aëdes vexans, Culex pipiens* and *Culiseta inornatus* were all recovered at 14 miles from the marsh, the distance having been covered in 4–16 hours. One *Anopheles quadrimaculatus* was recovered at 8 miles on the second day ; one *Anopheles punctipennis* at 7 miles and one at 10·5 miles on the seventh day. There was no apparent difference in the flight range of the male and female. [See also MESSERLIN, p. 742.] *V. B. Wigglesworth.*

HURLBUT (Herbert S.). **The Rate of Growth of *Anopheles quadrimaculatus* in relation to Temperature.**—*Jl. Parasitology.* 1943. Apr. Vol. 29. No. 2. pp. 107–113. With 3 figs.

One method used for describing the influence of temperature on the rate of development of an insect is to determine (usually by exterpolation from a graph) the lowest temperature at which development can occur (the developmental zero). The period required for development is then expressed as the total number of degree-hours or degree-days above the developmental zero that are necessary for its completion. Over a certain range of temperature this value is often found to be tolerably constant. The author has applied this method of temperature summation to the rate of growth of *A. quadrimaculatus*. The developmental zero is around 50°F. and fairly constant values have been found for egg, pupal and total development. Arguing that the big increase of *A. quadrimaculatus* in the spring represents the emergence of the second spring generation he suggests that these results might be used to predict the date of this occurrence. If the number of degrees in excess of 50°F. are summed daily from the spring until the degree-day value reaches 530, that will indicate the date by which one generation can reach maturity. A repetition of the process will give the date

for the second generation. The author calculates that there should be 9 or 10 generations annually in northern Alabama.

V. B. Wigglesworth.

PETERS (Harold T.). **Studies on the Biology of *Anopheles walkeri* Theobald (Diptera : Culicidae).**—*Jl. Parasitology.* 1943. Apr. Vol. 29. No. 2. pp. 117–122. With 4 figs. [10 refs.].

A. walkeri has been found to be very common in the Mississippi River Valley in South-Eastern Minnesota. It differs from the other North American species of Anopheles in overwintering in the egg stage. Photographs are given of the small summer eggs and the larger winter eggs in which the floats are longer and a reticulated exochorion extends over the dorsal surface. These winter eggs remained viable even when kept moist at a temperature of −21°C. for 72 hours. After exposure to −25° or −27·2°C. the larvae failed to extricate themselves from the egg shell. The larvae were found chiefly among vegetation in water well exposed to light. They were largely eliminated by a fall in water level. Planned control based on this observation should prove efficient.

V. B. Wigglesworth.

ROY (D. N.) & GANGULI (S. K.). **The Precipitin Test and the Production of Precipitating Sera.**—*Indian Med. Gaz.* 1943. Feb. Vol. 78. No. 2. pp. 81–89. With 4 figs. [27 refs.]

This is a useful detailed account of the preparation of precipitating sera and of the manner of carrying out the precipitin test to determine the nature of the stomach content of blood-sucking insects. The authors have found Belgian rabbits to be useful for the production of sera in India. The immunizing serum injections were made in the marginal vein of the rabbit's ear, in fractional quantities, 0·1 cc. a day during the first week, 0·2 cc. a day during the second week, and 0·3 cc. a day during the third week. During the third week the rabbit's blood is examined frequently to determine the precipitin titre. The serum of a "good" rabbit develops a fairly high titre in from 12 to 16 days, and such a serum kept in a refrigerator retains its potency for a year. It was difficult to obtain a high titre serum in India in the hot weather. Much larger quantities of serum are obtainable by repeated cardiac puncture than by bleeding the rabbit to death. The authors describe their method of carrying out the precipitin test. The paper contains nothing very original but it should be of value to workers who are but little conversant with the technique.

Norman White.

BIRKS (P. H.). **Symptomatology of Malaria.**—*Brit. Med. Jl.* 1943. June 26. pp. 784–785.

The author has been in medical charge of a unit that has been heavily exposed to malaria in India. He has been impressed by the protean nature of the symptoms of malaria infection. In addition to the acute febrile forms of the disease, including many cases with grave symptoms, very many patients have been seen with one or other of the following symptoms: pains in the back, rheumatic pains about joints, pain in the testicles, urticaria, multiple conjunctival ecchymoses, cardiac irregularity, recurrent diarrhoea, and obstinate eczematoid conditions, all without fever. Brief notes are given of illustrative

cases. Thick drop blood preparations revealed malaria parasites in all cases, and all the patients responded to a standard course of malaria treatment. *Norman White.*

NIYOGI (A. K.). **Complement Fixation of Human Serum in *Plasmodium vivax* Infection with *Plasmodium knowlesi* Antigen.**—*Ann. Biochem. & Experim. Med.* Calcutta. 1942. Vol. 2. No. 1. pp. 51–54.

Plasmodium knowlesi antigens were prepared by extracting the powdered dry spleen of a monkey which had died at the height of infection. The most satisfactory antigen was given by prolonged (1½ years) extraction of the powder at room temperature (21°C.–13°C.) with normal saline containing 0·5 per cent. of phenol. The extracts were filtered through filter paper, the filtrates being used as antigens in varying dilutions. *P. vivax* infection in man gave positive complement fixation reactions. *C. M. Wenyon.*

COVELL (G.). **Note on Economy in the Use of Anti-Malarial Drugs.**—*Indian Med. Gaz.* 1942. Nov. Vol. 77. No. 11. pp. 643–646.

The author refers to the controlled experiments carried out in many countries under the auspices of the Malaria Commission of the Health Organization of the League of Nations as set out in that Commission's Fourth General Report. These showed that the long continued administration of antimalarial drugs when the disease is latent does no good and may be harmful, and that short courses of treatment and moderate dosage, for primary attacks and relapses alike, are sufficient to control the disease in most cases, without undue interference in the acquisition of immunity. Economy in the use of quinine necessitated by the shortage of supply is the motive of the article, which deals also with the merits and limitations of atebrin and plasmoquine.

The author refers also to the great importance of the spray-killing of adult mosquitoes as a measure of malaria control, and expresses the opinion that the extension of pyrethrum cultivation in India is of even more importance for the future of malaria prevention than that of cinchona.

An editorial in the same issue of the *Gazette* is devoted to the "austerity" course of quinine and the present shortage of antimalarial drugs. [In the criticisms directed at the Government of India's short-sighted policy in years gone by, in not expanding their cinchona plantations, a little less than justice is done. Attempts were made to extend plantations but very great difficulty was met in finding suitable land for cinchona plantations. Experimental plantations in southern Burma, from which much was hoped, were not a success.]

Norman White.

HAMILTON (A. H.). **A Preliminary Report on the Treatment and Prophylaxis of Malaria in Southeast Asia.**—*U.S. Nav. Med. Bull.* 1943. Jan. Vol. 41. No. 1. pp. 267–272. With 1 fig.

The author has had much experience of the treatment of malaria in the Netherlands East Indies. A footnote states that in writing this paper free use has been made of the publications and teaching of DE

LANGEN, formerly Professor of Medicine in Batavia. For both treatment and clinical prophylaxis very decided preference is expressed for quinine as compared with synthetic remedies. He considers atebrin, and still more plasmoquine, dangerous drugs to use. [The toxicity of these drugs is overstressed.] In the treatment of the acute attack 15 grains of quinine hydrochloride divided into two doses are given daily for a week; relapses are treated in like manner. For clinical prophylaxis the administration of 10 grains of quinine hydrochloride on each of two successive days each week is recommended. The objections expressed to the prolonged administration of quinine in very large doses, which was formerly advocated, are likely to meet with universal approval. *Norman White.*

BOYD (Mark F.). **On the Therapeutic Interruption of Artificially Induced Malaria Infections.**—*Amer. Jl. Trop. Med.* 1943. Jan. Vol. 23. No. 1. pp. 49–52.

The author comments on the fact that artificially induced *P. vivax* infections are extremely sensitive to treatment and records the results obtained in 27 patients in whom it was necessary to terminate the infection. All these patients had been infected by intravenous inoculation. In four instances the administration of quinine in amounts ranging from 1 to 4 gm., in single or divided doses, apparently terminated the infections. In one patient a single dose of 0·6 gm. appeared to have had the same result. That infection had been really eradicated in two of these patients was shown by the inoculation of large quantities of their citrated blood into susceptible individuals, who remained free from any sign of infection. One of these two had received as little as 2 gm. of quinine. Artificially induced *P. falciparum* infections behave otherwise; recurrences occur after what is generally considered to be adequate quinine therapy. Two striking examples are given. *Norman White.*

AYALA (F.) & BRAVO (G.). Psicosis observadas en el tratamiento de la malaria con atepé: [**Psychosis observed in the Treatment of Malaria with Atepé.**]—*Rev. Clin. Española.* 1942. Oct. 15. Vol. 7. No. 1. pp. 70–72.

This paper contains clinical notes of four cases of malaria in which severe mental disturbance was manifest during or immediately after treatment with Atepé. [Atepé tablets each contain 0·1 gm. atebrin and 0·005 gm. plasmoquine: the usual adult dose is three tablets a day for seven days, see this *Bulletin*, 1938, Vol. 35, p. 897.] Such cases of mental disturbance seen by the authors can be grouped as follows: (1) Cases of slight mental excitation in persons with no psycho-pathological taint; the symptoms are ephemeral, lasting three or four days or less. (2) Cases of psychomotor excitation of more pronounced type than the last; either mental exaltation or depression may be present. After recovery these patients have no recollection of recent events. In these cases also there is generally no previous history of mental disturbance. (3) Cases of well-defined psychosis in patients with a psycho-pathological taint. Two of the four cases described by the authors were of this nature.

The frequency of such mental complications of atebrin therapy is very small; including even the mildest manifestations of mental abnormality the total incidence does not exceed one per cent.

Norman White.

WHELEN (M.) & SHUTE (P. G.). **Thio-Bismol in Therapeutic Malaria.**—*Jl. Trop. Med. & Hyg.* 1943. Feb.–Mar. Vol. 46. No. 1. pp. 1–5. With 5 charts.

The results obtained by the administration of 0·2 gm. of thio-bismol, during the developed stage of therapeutic malarial fever, to 19 patients, confirm the findings of COLE, DEOREO, DRIVER, JOHNSON and SCHWARTZ [this *Bulletin*, 1941, Vol. 38, p. 178]. The drug is effective alike in infections by blood inoculation and infections by the bites of infective mosquitoes. Thio-bismol given in these conditions nearly always produces a remission of 48 hours which is followed by regular tertian fever. The drug appears to act on the parasites that are more than half grown; this selective action on alternate cycles appears to explain the transformation of remittent to tertian fever. *P. vivax* was the species of parasite used in all cases. Thio-bismol given during the incubation period did not affect the time of onset or the type of fever. The optimum time to administer thio-bismol is about the fourth day after the onset of the febrile attack; if given earlier the tertian fever may revert to quotidian fever before the patient has had the requisite number of attacks. The authors conclude that the drug has very definite value in therapeutic malaria. *Norman White.*

COVELL (G.). **Public Health Organization. The Public Health Aspect of Malaria Control.**—*Indian Med. Gaz.* 1942. Dec. Vol. 77. No. 12. pp. 741–744.

This article breaks no new ground, but it serves a useful purpose in describing once more the organization necessary for the control of malaria in India. It is essential that there should be in each province of India an adequately staffed permanent malaria organization. The status and emoluments of the officers in charge should be comparable with those of an assistant director of public health, and the subordinate staff should be adequately recompensed. The functions of these provincial malaria organizations are described and it is urged that their activities should be linked with those of the central malaria organization of the Government of India. Attention is called to the importance of instructing engineers, employers of labour and government officials in the elementary principles of antimalarial sanitation. Much is made of the very great importance of the spray-killing of adult mosquitoes as a malaria control measure: it is the only antimalaria measure that is universally popular, and it is the only measure which can produce an immediate effect on an epidemic of malaria. It is considerably cheaper than any antilarval measure. The extension of pyrethrum cultivation should receive active encouragement from all local governments where climatic and agricultural conditions for its cultivation are suitable. *Norman White.*

RUSSELL (Paul F.), KNIPE (Fred W.) & RAO (H. Ramanatha). **On Agricultural Malaria and its Control with Special Reference to South India.**—*Indian Med. Gaz.* 1942. Dec. Vol. 77. No. 12. pp. 744–754. [31 refs.]

There are many ways in which malaria and agriculture react on each other in India.. Malaria may retard agricultural development and may even force the abandonment of large tracts of agricultural land. Malaria is the cause of much suffering and great expenditure on plantations of tea, coffee, rubber, pepper and cardamoms. Malaria is a severe handicap in the exploitation of forest resources. Irrigation malaria is an urgent problem, as is man-made malaria generally. The more extensive and intensive the agricultural practice the less intense and extensive may malaria become. Examples are given of all these reactions between malaria and agriculture. Most space is devoted to the problems related to irrigation malaria. Readers who are conversant with the authors' numerous reports on the malarial conditions in the Pattukkottai taluk of the Tanjore District of South India will find little that is new in this interesting summary. The spray-killing of adult mosquitoes is effective and can be carried out in many small villages for an over-all cost not exceeding a quarter of a rupee per head per year. Control by antilarval measures involves a certain initial outlay but maintenance costs have been reduced, in some cases, to less than two annas per head per year. *Norman White.*

MESSERLIN (A.). Note sur l'emploi de l'arsénite de calcium comme poudre larvicide dans la lutte antipaludique. [**The Use of Calcium Arsenite as a Larvicide in Antimalaria Work.**]—*Bull. Inst. Hyg. Maroc.* 1941. N.S. Vol. 1. pp. 69–78.

Economic and other conditions made it difficult to obtain oil for antilarval measures in Morocco and the manufacture of Paris green was suspended in France owing to the insufficient copper supply. Such circumstances prompted the search for another effective larvicide. This paper describes laboratory experiments with arsenate of lead, arsenate of cobalt, and arsenite of calcium. The arsenates were of little value as larvicides but calcium arsenite gave results but little inferior to those with Paris green. Field experiments confirmed the value of calcium arsenite, which has since been used on a large scale. It is being used in exactly the same manner as was Paris green and in the same dilution. Powdered marble is used as a diluent. It appears to be as effective as was Paris green. *Norman White.*

BOLTEN (Joseph). **The Prevention of Malaria among the Military Forces in Puerto Rico.**—*Bol. Asoc. Med. de Puerto Rico.* 1943. Mar. Vol. 35. No. 3. pp. 89–96.

Malaria is a serious problem for the military authorities in Porto Rico. In 1941 the annual malaria case rate among the forces stationed there varied between 40 and 85 per thousand per month between January and July, rose to 180 in August, and remained between 100 and 150 for the rest of the year. During the first half of 1942 the incidence was double that of the previous year; thereafter it declined to about half the 1941 rates. This paper describes the intensive measures that are being taken to combat the disease.

Anopheles breed throughout the year. Of the three possible vectors *A. albimanus*, *A. grabhami* and *A. vestitipennis*, *A. albimanus* is by far the most important. The variety and extent of its breeding places make it difficult to control. Drainage ditches in sugar-cane fields, mangrove swamps behind the coastal dunes, hollows and hoof prints in pastures during the rainy season, lakes and irrigation reservoirs, and a host of man-made breeding places resulting from road construction (impeding drainage) and borrow pits, all contribute to the density of *A. albimanus*. Malaria control work in cantonments is carried out by the Army and Navy. The United States Public Health Service is responsible chiefly for work outside cantonments. The Island's Health Department undertakes control measures in towns, and a drug treatment programme. *P. falciparum* is the prevalent species. Antilarval measures include the use of Paris green and oil, drainage and filling. Airplane dusting with Paris green of breeding areas where control by hand labour is impracticable is in the experimental stage. Mosquito traps of the Earle, Porto Rico, type are used to measure the success of antilarval measures. In few, if in any, areas has the density of *A. albimanus* been reduced as yet to safe limits. The very remarkable decline in malaria incidence that has been achieved is attributed to improved mosquito proofing of barracks and quarters and the spray-killing of such mosquitoes as penetrate the screens.

Norman White.

HUGHES (William) & MURGATROYD (Frederick). **Drug Control of Malaria.**—*Lancet.* 1943. June 5. pp. 699–702. [27 refs.]

This is an adequate discussion of the value and limitations of the well tried antimalarial drugs in the treatment of clinical attacks and in suppressive treatment. Difficulties that arise in the diagnosis of malaria are also briefly discussed. Both discussions follow familiar lines.

Norman White.

FULTON (J. D.) & YORKE (Warrington). **Studies in Chemotherapy. XXXII.—Further Observations on Plasmoquine-Resistance in** *Plasmodium knowlesi.*—*Ann. Trop. Med. & Parasit.* 1943. Apr. 30. Vol. 37. No. 1. pp. 41–47.

In a previous paper the authors showed that it was possible to make a strain of *Plasmodium knowlesi*, in *Macacus rhesus*, resistant to plasmoquine by treating the infections in a series of monkeys with the maximum tolerated dose (13·2 mgm. per kilo. intramuscularly on each of four successive days) or with smaller doses according to the condition of the animals [this *Bulletin*, 1942, Vol. 39, p. 438]. It was their intention to maintain the strain thus rendered resistant as a chronic infection for some months and then to test the resistance again. Unfortunately the strain was lost.

In the present paper the authors describe how the original strain was again made resistant by exposure to plasmoquine during its passage through eight monkeys. Each monkey was treated one or more times with plasmoquine before the strain was inoculated to the next monkey. In the fifth monkey the maximum tolerated dose of plasmoquine failed to have any effect on the infection. The strain, which had become resistant, was then inoculated to another monkey,

and when infection developed this was cut short by a single dose of atebrin (0·1 gm. orally). The infection then became chronic, the animal surviving. After five and a half months in this monkey the strain was passed to another monkey, which, when the infection developed, was treated with the full course of plasmoquine; this cleared the blood of parasites for only a single day. Parasites reappeared, and the animal was given a second maximum course which failed to control the infection. During the course of this infection another monkey was inoculated. When the infection developed, the full course of plasmoquine controlled it slightly, but the parasites rapidly increased in number. It is concluded that plasmoquine-resistance in *P. knowlesi* has some degree of stability in that the resistance persisted, in part at least, during a period of over five months, while the strain was maintained in a *Macacus rhesus* in a chronic state resulting from a single dose of atebrin. It may be noted that in the first monkey of the series the treatment of the infection resulted in the disappearance of parasites from the blood for eleven days. In subsequent monkeys the period of absence of parasites following treatment was less, till finally no absence occurred.

C. M. Wenyon.

NIYOGI (A. K.). **Effect of *Plasmodium knowlesi* Antigen on Acute and Chronic Infections with the Homologous Strain of Parasite in *M. rhesus*.**—*Ann. Biochem. & Experim. Med.* Calcutta. 1942. Vol. 2. No. 1. pp. 55–58.

The author has shown that the injection of suspensions of *Plasmodium knowlesi* in physiological saline containing 0·5 per cent. phenol, into monkeys suffering from chronic infections of the same species of malarial parasite, will bring about a reduction in the number of parasites in, or even their temporary complete disappearance from, the peripheral blood. No such effect is produced when the injections are made into monkeys suffering from acute infections.

C. M. Wenyon.

NIYOGI (A. K.) & ROY (A. N.). **Observations on *in-vitro* Cultivation of *Plasmodium knowlesi* by a Modified Bass and Johns Method.**—*Ann. Biochem. & Experim. Med.* Calcutta. 1942. Vol. 2. No. 1. pp. 59–62.

Blood was withdrawn from a monkey suffering from *Plasmodium knowlesi* infection. It was defibrinated and to each cc. was added 0·03 cc. of 50 per cent. glucose solution. The mixture was then distributed in Kahn tubes, 2 cc. to each tube. The tubes were incubated at 24°C. or 37°C. The parasites in the tubes developed at the same rate as those in the blood of the monkey up to the production of the first batch of merozoites, some of which invaded fresh corpuscles and appeared to complete the next schizogonic cycle. Degeneration of parasites in increasing numbers took place from the twelfth hour of culture onwards. As regards the infectivity to monkeys, the cultures kept at 24°C. were infective for four days, whereas those kept at 37°C. were infective for two days only.

C. M. Wenyon.

MANWELL (Reginald D.). **The Low-Temperature Freezing of Malaria Parasites.**—*Amer. Jl. Trop. Med.* 1943. Jan. Vol. 23. No. 1. pp. 123–131. With 2 plates.

The paper describes a technique devised by the author for laboratory preservation of strains of malarial parasite in the frozen state. For this purpose small quantities of blood in test tubes were rapidly frozen to −65°C. to −78°C. by immersion in chilled alcohol. The tubes were then placed in a small ice box containing dry ice and refrigerant. The tubes in the box, which maintains a temperature of −55°C. to −78°C., were partly immersed in alcohol. The 60 lb. of ice which the box would hold required renewal every five to seven days. At intervals tubes were removed, the blood thawed by immersion in water at 40°C. and the morphology of the blood cells and parasites studied in stained films, or the viability of the parasites tested by inoculation of susceptible hosts. In all, ten species of bird malarial parasites were frozen and in all cases they proved to be viable after periods varying from 46 to 212 days. There was no reason to suppose that all the parasites would not have survived 212 days or longer if tested after this interval. It is noted that *Trypanosoma lewisi* has also been preserved in this way. *C. M. Wenyon.*

MCLENDON (Sol B.). **Experimental Attempts to infect Man with Avian Malaria.**—*Amer. Jl. Hyg.* 1943. Jan. Vol. 37. No. 1. pp. 19–20.

Washed red blood corpuscles from a pigeon infected with *Plasmodium relictum* were inoculated intravenously to seven male negro neurosyphilitics. In no case was it possible to detect parasites in the blood of the inoculated individuals, but in one case in which the injection material contained 13 billion [thousand million] blood corpuscles and 9 billion parasites, blood withdrawn up to four and a half hours after the injection proved capable of infecting clean pigeons. Blood taken after longer intervals failed to do so. *C. M. Wenyon.*

SEELER (Albert O.), GRAESSLE (Otto) & DUSENBERY (Edwina D.). **The Effect of Para-Aminobenzoic Acid on the Chemotherapeutic Activity of the Sulfonamides in Lymphogranuloma Venereum and in Duck Malaria.**—*Jl. Bacteriology.* 1943. Mar. Vol. 45. No. 3. pp. 205–209.

The author refers to the well-established fact that *p*-aminobenzoic acid inhibits the action of sulphonamides in various types of infection. In the present paper its inhibitory effect on the therapeutic action of sulphamethyldiazine in *P. lophurae* infection of Peking ducklings as well as of that drug and sulphanilamide on a strain of lymphogranuloma inguinale has been investigated.

Thirty-eight ducklings were inoculated with *P. lophurae* intravenously. Of that number 12 were given 200 mgm. per kilo of sulphamethyldiazine alone daily, and 12 others the same amount of the drug with an equal quantity of *p*-aminobenzoic acid. Eight birds received the acid alone, while six others served as controls. The drug was incorporated in food so as to maintain the blood level. Therapy was started on the day of inoculation and continued for 10 days. The infection in the control birds and those receiving *p*-aminobenzoic acid only,

followed the same course. The infection in ducks which received sulphamethyldiazine alone ran a mild course in contrast to the severe infection in the control birds and in those which received the drug along with *p*-aminobenzoic acid. It was concluded that *p*-aminobenzoic acid completely neutralized the protective action of sulphamethyldiazine. A similar result was obtained, as the authors point out, by MARSHALL, LITCHFIELD and WHITE [this *Bulletin*, 1943, Vol. 40, p. 223] with a number of other sulphonamides in *P. lophurae* infection of ducks. The suggestion is made that *p*-aminobenzoic acid or related substance is required by the parasite. [It is in keeping with the theory of the mode of interaction of *p*-aminobenzoic acid and sulphonamides.]

In the studies of lymphogranuloma inguinale, young mice were inoculated intracerebrally with 0·02 ml. of a 1 : 100 suspension of infected mouse brain. It was known that the strain of lymphogranuloma inguinale reacted well to various sulphonamides. Sulphanilamide and sulphamethyldiazine were used in the experiment and the drugs as well as *p*-aminobenzoic acid were incorporated in food so that 10 mgm. per 20 gm. were consumed daily. The usual controls were employed and from the results obtained it was concluded that *p*-aminobenzoic acid has little if any inhibitory effect on the protective action of sulphanilamide and sulphamethyldiazine on the strain of lymphogranuloma inguinale employed. The results of FINDLAY [*Bulletin of Hygiene*, 1941, Vol. 16, p. 270], who found that *p*-aminobenzoic acid neutralized the action of sulphanilamide in this infection, were not confirmed. The authors suggest that the mode of action of sulphonamides in lymphogranuloma inguinale may be different from that on other disease agents. Previous investigations had shown that whereas mice were protected by the drugs in question, the virus was not eradicated, and was recoverable. *J. D. Fulton.*

BLACKWATER FEVER.

MURGATROYD (F.). **The Modern Treatment of Blackwater Fever.**—*Med. Press & Circular.* 1943. July 28. pp. 58–60.

The aetiology of blackwater fever is not fully understood but usually the attack seems to be precipitated by an antimalarial drug and to occur in persons who have been infected for some time with malaria, generally with the malignant tertian parasite. The occurrence of blackwater fever cannot be predicted nor is any sure means of prevention in malarious countries known.

There is a sudden intravascular haemolysis which is shown by haemoglobinuria and is associated with fever, vomiting, loin pain and jaundice. There may be only a single attack, or successive waves of haemolysis may rapidly produce severe anaemia and a dangerous condition. Malaria parasites usually disappear from the blood at the onset of blackwater fever. The kidney tubules are damaged and become plugged with cellular débris and insoluble substances, and the latter seem to be precipitated especially in acid urine. The urine becomes diminished in quantity and suppression and death from uraemia may follow.

Treatment.—Absolute rest in bed is necessary, so transport of the patient should be avoided if possible. Much fluid should be drunk in order to dilute the urine. Sodium citrate is given by mouth or intravenously to make the urine alkaline; by mouth an initial dose of 120 grains is followed by 60 grains two-hourly until the urine is alkaline, and the dose is then adjusted to maintain the alkalinity; intravenously, 150 cc. of 3·8 per cent. solution is given, or, instead of sodium citrate, 20 cc. of a mixture of equal parts of a saturated solution of sodium bicarbonate and a 3-M solution of sodium lactate. Intravenous injections should be given very slowly. It is important to measure the fluid intake and output. Blood transfusion is needed if the anaemia is very severe. About a week or ten days after haemolysis has ceased, mepacrine or quinine should be given to prevent a malarial relapse. Quinine is given in gradually increasing doses three times a day, beginning with ½ grain and increasing up to 10 grains, but if haemolysis returns the quinine must be discontinued.

A person who has had an attack of blackwater fever should take care to avoid further attacks of malaria; if an attack occurs it is thought wiser to treat it with mepacrine than with quinine.

J. F. Corson.

TRYPANOSOMIASIS.

VAN GOIDSENHOVEN (C.) & SCHOENAERS (F.). L'isolement des trypanosomes par centrifugation fractionnée du sang. [**Isolation of Trypanosomes by Fractional Centrifugation of Blood.**]—*Ann. Soc. Belge de Méd. Trop.* 1942. Sept. 30. Vol. 22. No. 3. pp. 213–222.

After trying several procedures for isolating and concentrating blood trypanosomes for the diagnosis of light infections and for the preparation of antigen for complement fixation tests, the authors adopted the following method for the preparation of *equiperdum* antigen. The blood of infected white rats is mixed with twice its volume of citrated saline and centrifuged for five minutes at 7,000 r.p.m. The deposit is suspended in normal saline and centrifuged for 10 minutes at 1,000–1,200 r.p.m. The supernatant liquid together with most of the white upper layer of the deposit is again centrifuged for 10 minutes at 1,000–1,200 r.p.m. and this is repeated twice. Finally, the suspension is centrifuged twice for five minutes at 7,000 r.p.m. The deposit is then mixed with twice its volume of equal parts of normal saline and glycerine.

J. F. Corson.

AUGUSTINE (Donald L.). **Some Factors in the Defense Mechanism against Reinfection with** *Trypanosoma lewisi*.—Reprinted from *Proc. Amer. Acad. of Arts & Sciences.* 1943. May. Vol. 75. No. 3. pp. 85–93. With 5 figs. on 1 plate. [10 refs.]

Some years ago TALIAFERRO demonstrated that the mechanism of immunity acquired by rats infected with *Trypanosoma lewisi* involves the participation of two antibodies. One of these, ablastin, inhibits the reproduction of the trypanosomes, leaving in the blood only non-dividing forms; the other, which appears on the scene later,

has a trypanocidal effect, causing the disappearance of the "adult" forms and terminating the infection in rats, which then become refractory to reinfection. [See this *Bulletin*, 1933, Vol. 30, p. 122; 1939, Vol. 36, p. 214; 1940, Vol. 37, p. 407.]

The present paper is devoted to a study of the defence mechanism against reinfection, regarding which very little is known. It was formerly thought that in rats spontaneously recovered from a previous infection, trypanosomes introduced intraperitoneally were prevented from penetrating into the circulation by the lymph nodes, which formed an effective barrier. However, the author has demonstrated, in experimental reinfections of rats, that trypanosomes inoculated by this route passed without hindrance through the lymph nodes and appeared in the blood stream. Here they remain for a short time only, and can be recovered from the blood for periods varying from a few minutes to several (4-5) days, in the course of which they may manifest signs of multiplication. During their sojourn in the blood the trypanosomes (irrespective of whether they had been introduced as "adult" or dividing forms, intraperitoneally or directly into the heart) are sensitized by trypanocidal antibodies which immobilize and agglutinate them, with the result that they are either destroyed in the circulating blood by macrophages or they are mechanically filtered out and disposed of in the liver and probably also in the spleen.

The mechanism of defence against reinfection appears to be fundamentally different from that in initial infections, since in the former case the reproductive activity of the trypanosomes is not inhibited and ablastin, therefore, does not appear to play any rôle. The author attributes the phenomena described to a single trypanocidal antibody, though he does not entirely exclude the possibility of two distinct ones (one an opsonin, the other an agglutinin) being involved.

C. A. Hoare.

OTÁLORA (B.). Enfermedad de Chagas en Colombia. [**Chagas's Disease in Colombia.**]—*Rev. de Higiene.* Bogota. 1942. Feb. & Mar. Vol. 23. Nos. 2 & 3. pp. 19–30.

In 1929, Dr. PIEDRAHITA recorded finding in Colombia *Rhodnius prolixus* infected with *T. cruzi*. Several hundreds of these insects have now been examined and 31·4 per cent. of the adults and 6·7 of the larvae and nymphs have been found positive. The difference is accounted for by the fact that the unwinged nymph and larva have but a limited range to suck blood. In July [? 1941] 358 serodiagnostic tests were made near Cundinamarca of persons living in huts heavily infested with the bug and of those in the vicinity, and blood was taken from 49 domestic animals. Previously the test had been made on 26 unselected children in the same region and 39 in other Departments, with negative result. In July, 270 blood samples were taken, nearly all from children, and also from 31 dogs and 18 cats. In August the test was carried out on six children and on 35 others in the neighbourhood; also on 10 dogs and five cats. The six children proved to be positive, and three others later—a child of three years, another of eight years and a woman of 20 years. Again, in August the test was made on 36 children of school age and under in a municipality of Guateque (Boyacá) where Rhodnius abounds, and two were positive. [The statements detailed are very mixed and difficult to unravel.]

Of 512 xenodiagnostic tests 13 were positive. All the patients were apyretic and direct blood examination had revealed nothing. Brief details are given of ten children, ranging in age from 2 to 11 years.

It follows from the author's record that Chagas's disease is present in Colombia and its incidence is fairly high, especially among the poorer inhabitants. The xenodiagnostic test is not difficult to carry out and is the most reliable [nothing is said of the Machado reaction]. He advises further study of the proportional infection of the local Reduviidae and of possible animal reservoir hosts.

H. Harold Scott.

GASIC (G.) & CARVAJAL (V.). Clinica y epidemiologia de la enfermedad de Chagas en Chile. [**Chagas's Disease in Chile. Symptomatology and Epidemiology.**]—*Rev. Méd. de Chile.* 1941. Dec. Vol. 69. No. 12. pp. 818–833. With 18 figs. [22 refs.]

The clinical part of this article is based on 58 cases under the authors' observation. Of these 11 were acute, 42 subacute and five chronic. Of the first, two were in infancy (under five months of age), four were between 5 and 10 years, three were adolescents (13–20 years) and two were adults. Nine had unilateral palpebral oedema, and two had generalized oedema secondarily; ten had tachycardia, one bradycardia. The Machado reaction was positive in seven, negative in two (at an early period), in one *T. cruzi* was seen in the blood. Bayer 7602 was used in treatment in doses of 10–60 mgm. per kilo., repeated at weekly intervals, if the Machado reaction remained positive.

Of the 42 subacute cases one was in early infancy, 14 in "second infancy" (? 5–10 years), 20 in "third infancy" (? adolescence) and 7 were adults; 29 were males, 13 were females, but it must be borne in mind that more children than adults were examined and more males than females.

Tachycardia was present in 34, generalized adenopathy in 41, hepatomegaly in 29 and splenomegaly in twenty. Bayer 7602 was given, but was ineffectual, at least in the doses used. It seemed merely to reactivate the parasite and increase the numbers seen in the blood.

In the chronic stage diagnosis is very difficult. Four of the five were in hospital; three were confirmed by xenodiagnosis and one by a repeatedly positive Machado reaction. All five were adults between 40 and 60 years old.

From the epidemiological aspect the authors studied: (1) *The virulence of T. cruzi for man in the area.* It is to be noted that the disease is less severe on the Pacific than on the Atlantic side of this part of S. America. The authors postulate that the transmitter, *Triatoma infestans,* has existed much longer on the Pacific side and that inhabitants have acquired some immunity; further, on the Atlantic side constant influx of Europeans and others brings ever fresh non-immunes to the country. (2) *The transmitter.* This is *Triatoma infestans,* and of 9,000 specimens examined 40 per cent. were carrying *T. cruzi.* (3) *Reservoir hosts.* The chief are dog and cat. Of 184 dogs 20·4 per cent. were positive, and 4·4 per cent. of 136 cats. (4) *Incidence in man.* Of 728 sera of persons in the northern rural area tested 222 (30·4 per cent.) were positive to the Machado reaction; of 406 in the rural parts of Santiago Province 128 (31·5 per cent.) or together 350 out of 1,134 (30·8 per cent.). Of 419 hospital patients 40 (9·5 per cent.)

were positive. That is, altogether, 390 out of 1,553 (25·1 per cent.). (5) *The Fatality Rate.* This could not be determined on the data available.

[There is a sketch map with indices of the numbers of Triatoma examined in the different districts and the numbers found harbouring the parasite. This would be most instructive and useful, but unfortunately is on so reduced a scale and so poorly reproduced that most of it is illegible even with the aid of a lens.] *H. Harold Scott.*

ALVAYAY (J.) & CARVAJAL (V.) Tripanosomosis cardiaca americana. Investigación clínica y electrocardiográfica. Comunicación preliminar. [**Cardiac Conditions in Chagas's Disease.**]—*Rev. Méd. de Chile.* 1941. Dec. Vol. 69. No. 12. pp. 833–840. With 7 figs. [12 refs.]

This is a preliminary communication which is so detailed, yet so compressed, that it cannot be abstracted. Those interested should consult the original. Four cases are given in detail, together with a number of electrocardiograms, but too reduced to be of use in interpretation. Of five acute cases referred to all had sinus arrhythmia, two with tachycardia, two with normal frequency and one with bradycardia in the earlier stages of observation, later with normal frequency. Of twenty subacute cases cardiac disturbances were studied in 14 ; three had sinus arrhythmia, five arrhythmia with tachycardia, five tachycardia of sinus origin and one bradycardia. The relevant details of thirty patients are presented in a large table.

H. Harold Scott.

VIANA MARTINS (A.) & MACEDO (E.). Nota sobre a molestia de Chagas na Bolivia. [**A Note on Chagas's Disease in Bolivia.**]—*Brasil-Medico.* 1942. Vol. 56. No. 33. pp. 392–393.

MAZZA (S.). Consideraciones sobre la enfermedad de Chagas en Bolivia. [**Remarks on Chagas's Disease in Bolivia.**]—*Prensa Méd. Argentina.* 1942. Vol. 29. No. 51. Reprint 15 pp. [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. June. Vol. 31. Pt. 6. p. 111.]

The authors of the first paper state that the only record known to them of infection of any Triatomid in Bolivia by *Trypanosoma* (*Schizotrypanum*) *cruzi* is that of Neiva in 1916, who found that almost all of a batch of *Triatoma infestans*, Klug, taken in the Department of Potosi were naturally infected. Their own observations showed infection in 5 of 6 males, all of 6 females, and 6 of 10 nymphs of *T. infestans* taken in a locality in south-western Bolivia.

The author of the second paper points out that he himself in 1937 recorded natural infection of *T. infestans* by *Trypanosoma cruzi* in various parts of Bolivia ; 35 per cent. of the bugs were infected at about 12,000 ft. and 66 per cent. at about 9,000 ft. He gives further records of natural infection of *Triatoma infestans*, and states that *T.* (*Eutriatoma*) *sordida*, Stål (the eggs of which were parasitised by a species of *Telenomus*), and a single individual of *T.* (*E.*) *oswaldoi*, Neiva & Pinto, were also observed to be infected. *Psammolestes coreodes*, Bergr., taken in birds' nests, was not.

LEISHMANIASIS.

NIYOGI (A. K.) & RAY (J. C.). **Complement Fixation Test in Kala-Azar.**—*Ann. Biochem. & Experim. Med.* Calcutta. 1942. Vol. 2. No. 1. pp. 47–50.

After reviewing the attempts which have been made to prepare antigens which will give reliable complement fixation tests for kala azar the authors show that the results so far obtained are unsatisfactory. They in their turn have prepared antigens from washed flagellates from 48-hour cultures of *Leishmania donovani* which, in the tests so far carried out, have proved reliable. The flagellates are washed in distilled water or normal saline and brought to a strength of 60 million organisms per cc. The suspensions are subjected to 48 hours' shaking in a machine. If distilled water has been used the antigen is made isotonic by the addition of sodium chloride. The antigen is preserved in the refrigerator. With pooled guineapig serum for complement and sheep's red blood corpuscles and haemolytic sera prepared in rabbits, complement fixation tests were carried out on 10 cases of kala azar and a number of cases of other diseases, including two of dermal leishmaniasis. Positive reactions were obtained in all the kala azar cases, but not in any of the others. *C. M. Wenyon.*

PESSÔA (S. B.) & COUTINHO (J. O.). Infecção natural e experimental dos flebotomos pela *Leishmania brasiliensis*, no Estado de São Paulo. [**Natural and Experimental Infection of Phlebotomus by *L. brasiliensis* in the State of São Paulo.**]—*Hospital.* 1941. Vol. 20. No. 1. pp. 25–35. [Summary taken from *Rev. Applied Entom.* Ser. B. 1943. June. Vol. 31. Pt. 6. p. 111.]

Of, 9,273 sandflies (Phlebotomus) collected in infected zones of the State of São Paulo, Brazil, 21 harboured *Leishmania brasiliensis.* It was found predominantly from September to February in *P. migonei*, França, *P. pessoai*, Coutinho and Barretto, and *P. whitmani*, Antunes and Coutinho. *P. whitmani* and *P. fischeri*, Pinto, were experimentally infected by feeding on *Leishmania* nodules of monkeys; the forms of the parasite in them were identical with those in naturally infected sandflies.

FEVERS OF THE TYPHUS GROUP.

MCCARTHY (D. F.). **Notes on an Outbreak of Typhus Fever.**—*Med. Officer.* 1943. June 26. Vol. 69. No. 26. pp. 205–206.

This is an instructive report of an outbreak of louse-borne typhus fever.

During March and April 1942 five persons living in a house in Westport, Co. Mayo, were attacked by what was supposed to be influenza. Typhus was not suspected till 7th May when a member of the family, who had lived in the house for a fortnight in April, and who was being treated for suspected typhoid, showed symptoms suggestive of typhus. His Weil-Felix reaction was found to be positive and he died two days

later. Another resident in the house was attacked by typhus on 15th May, and a nurse who had attended one of the earlier patients in hospital was attacked on 16th May. A case occurred on 17th May in another house to which two of the persons already infected in the original focus had moved on 2nd May, just before they fell ill.

Altogether there were nine cases, of which three were fatal: in five the Weil-Felix reaction was positive in titres ranging from 1–25 to 1–5,000; in the other four the test was not carried out. Two of the cases treated in hospital are described; these were typical examples of severe typhus fever.

There had been no known case of the disease in Co. Mayo during the previous nine years, but later investigation showed that many persons in the affected locality had positive Weil-Felix reactions, the titre being 1–25. The author suggests that typhus fever must have persisted in the area in mild endemic form, giving rise to attacks which were mistaken for such diseases as influenza. *John W. D. Megaw.*

SIKORA (Hilda). Zur Morphologie der Rickettsien. [**The Morphology of the Rickettsiae.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1942. Nov. 9. Vol. 124. No. 3/4. pp. 250–270. With 1 coloured folding plate & 3 figs. [39 refs.]

This paper, which is fully illustrated by plain and coloured drawings, contains the results of a prolonged and careful study of various Rickettsiae and allied organisms. The stain employed was Giemsa's; three drops were diluted in 20 cc. distilled water and applied for 24 to 48 hours. More recently the author has used the ordinary dilution of one drop in 1·0 cc. of distilled water, but no alkali was added, and the stain was allowed to act for six hours. By these methods the organisms were stained red throughout, and it is claimed that a blue colour in the bacillary forms is due to insufficient staining. All the drawings were made at a magnification of 3,000 diameters and the illustrations are further enlarged to 8,000 diameters.

The various forms described are regarded as corresponding to different stages in the growth and multiplication of the organisms. These stages normally are:—(1) rounded or oval non-cellular granular forms, each of which elongates and becomes (2) a short rod-shaped or barrel-shaped cellular body with a granule at each end. Exceptionally these bodies divide directly and give rise to two granules, but the normal development is further elongation, and subdivision of the granules, with the production of (3) bacilliform bodies with three or four granules in each. Each bacilliform body then divides into (4) two plump bodies, each of which has two polar granules. These bodies elongate, become slender and then (5) dumb-bell shaped. With the disappearance of the intermediate substance between the granules the cycle is complete, and four daughter granules are produced from the parent granular form.

Similar stages of development occur in the organism of fowl cholera, which is regarded by the author as forming a connecting link with true bacteria.

The existing definitions of Rickettsiae are not satisfactory, because some of these organisms are not intracellular in their habitat, and some can grow in cell-free culture media. The author's definition is based on morphological characters, it is "Microorganisms which,

even in favourable environmental conditions maintain a granular form, and become bacilliform only during the period of multiplication."

[The author claims that her observations made at magnifications of 3,000 have revealed details of structure which could not be seen by WOLBACH and others with magnifications of about 1,500. This claim is open to criticism, because all expert microscopists agree that the finest existing objectives will not yield true images when the magnification exceeds 1,500 diameters; changes in the appearance of the image resulting from higher magnifications are likely to be due to diffraction and interference effects and therefore to bear no relationship to the true structure of the object.

The advantage claimed for intensive staining is also questionable.

Further light on the morphology of the Rickettsiae can only be expected from the employment of the electron microscope, which yields true images at far higher magnifications than are available with the ordinary microscope. PLOTZ and his colleagues, since the appearance of the present article, have made an important advance in the knowledge of the structure of the Rickettsiae with the help of the electron microscope [see this *Bulletin*, 1943, Vol. 40, p. 685].

John W. D. Megaw.

GIROUD (P.) & PANTHIER (R.). L'évolution des rickettsies des fièvres exanthématiques est fonction de leur végétabilité dans les tissus qu'elles parasitent. [**Differences in the Structural Forms of the Typhus Rickettsiae are associated with Differences in the Vital Activities of these Organisms in the Tissues in which they are Parasites.**]—*Bull. Soc. Path. Exot.* 1942. Jan. 14 & Feb. 11. Vol. 35. Nos. 1–2. pp. 6–8. With 4 figs. on 1 plate.

A literal translation of the title of this paper would not convey a true impression of the meaning of the authors, whose main contention is that each structural phase of the Rickettsia represents the result of a special type of reaction of the host to the invading parasite. The authors have already expressed very similar views [see this *Bulletin*, 1942, Vol. 39, pp. 753–754].

The bacilliform Rickettsiae are the actively reproducing and highly pathogenic forms; they are strongly antigenic but at the same time they offer little resistance to adverse influences.

Granular clumps of Rickettsiae are formed when the host is putting up resistance to the organisms. Homogeneous bodies are formed when the host has overpowered the Rickettsiae and caused them to lose their structural identity. Granular forms, either isolated or in clumps, are found in the organs of animals in which the Rickettsiae are adapting themselves to their hosts. These granules can give rise to bacilliform Rickettsiae when infective material in which they are contained is passaged through animals. *John W. D. Megaw.*

ABRIKOSOV (A. I.). [**Pathological Anatomy of Typhus Fever.**]—*Sovietskaja Medicina* [=*Soviet Medicine*]. Kazan. 1941. Nos. 23–24. pp. 8–11. [In Russian.]

In this concise and lucid account of the pathological anatomy of typhus fever the disease is characterized as a generalized acute

infectious angiitis, all the clinical symptoms being attributable to changes in the vessels, especially the arterioles and capillaries. The main vascular lesions are represented by (1) necrosis and destruction of the walls, (2) thrombosis, and (3) cellular proliferation, both in the walls and around them. Angiitis most frequently assumes one of the following types : (*a*) verrucose endoangiitis, (*b*) proliferative destructive thromboangiitis, (*c*) proliferative angiitis, and (*d*) necrotic angiitis.

The author further discusses the pathogenesis of the changes in the arteriolo-capillary system in typhus fever, regarding which opinions differ. He believes that these changes are brought about both by the rickettsiae penetrating into the endothelium of the vessels and by allergic sensitization of the latter. The vascular changes are found in all organs and tissues, and especially the brain, where they give rise to a specific form of encephalitis. Amongst other tissues affected are mentioned the sympathetic and intervertebral ganglia, the suprarenals, testicles, cardiac and voluntary muscles.

It has been demonstrated that during convalescence the nodular granulomata in the brain and other organs (proliferative angiitis) disappear entirely. This is because the proliferated cells degenerate and are absorbed, after which the normal structure of the vascular walls is re-established.

The post-mortem diagnosis of typhus fever may present some difficulties. In such cases microscopical preparations of the medulla —showing the characteristic granulomata—are of great value. In addition to these the Weil-Felix test can be made with serum obtained from the corpse. *C. A. Hoare.*

Ryžov (A. A.). [**Subterranean Chambers for the Fight against Typhus Fever in the Village.**]—*Sovietskaja Medicina* [=*Soviet Medicine*]. Kazan. 1941. Nos. 23–24. pp. 30–31. With 1 fig. [In Russian.]

The author describes a simple type of delousing chamber which can be built rapidly and at low cost under rural conditions. A hut, made of wattle-and-daub, or other suitable material, and measuring 7 by 2·75 metres with a height of 2 metres, is constructed inside a rectangular pit excavated in the ground. The space between the walls of the hut and those of the pit is filled up with sawdust, dry leaves, or other material. The roof of the hut (13·5 cm. thick) is covered first with a 10 cm. layer of clay, then with 60–80 cm. of straw, rushes or branches ; this is covered with 50 cm. of earth, with a layer of turf on the top. The floor is made of beaten clay.

The hut is divided by two partitions into three compartments. It has a small window in the roof and two others in the doors leading into and out of the central compartment, which represents the delousing chamber. Contaminated clothing is brought through an outside door into a compartment at one end of the hut, thence into the central chamber where the various articles are suspended from hooks in the ceiling. The central chamber is heated by two iron stoves placed at opposite ends and provided with exit pipes running through the roof. Delousing takes place at 80–100°C. during 25–30 minutes, which is sufficient to destroy both the lice and the nits. The clothing is then removed into the third (clean) compartment which has an independent exit.

This type of chamber can be constructed in three or four days and it has been recommended for general use by the Chief State Sanitary Inspectorate of U.S.S.R. *C. A. Hoare.*

PICKHAN. Neues ueber Fleckfieberforschung. Zur Eröffnung der Fleckfieberforschungsstätte (Behring-Institut) in Lemberg. [**A Survey of Recent Typhus Fever Research.**]—*Deut. Med. Woch.* 1943. Feb. 19. Vol. 69. No. 7. pp. 158–160.

This is a brief report of proceedings connected with the opening of the Lemberg Typhus Research Institute in December 1942.

Various aspects of recent work on typhus fever were discussed by German experts. [Considering the exceptional opportunities that have been available for the Reich workers, surprisingly few advances in connexion with the disease were reported.]

GILDEMEISTER referred to the egg-yolk vaccine prepared by himself and HAAGEN at the Robert Koch Institute; this, in all essential respects, is the Cox vaccine, but no reference is made to the originator of the method. The vaccine is regarded as being of special value in reducing the severity of the attacks, but louse control is admitted to be the best defence against the disease.

ROSE also stressed the importance of louse disinfestation; he said that isolated cases in a louse-free community could never give rise to outbreaks of the disease. He regarded dry heat as the best method of disinfestation and referred to small portable hot-air apparatus as being a notable advance. The so-called "louse powders" were not considered so satisfactory as the impregnation of clothing with substances which destroy lice without damaging the wearer.

EYER dealt with serological diagnosis in field conditions; he praised the Cracow preparation, which consists of dried cultures of *Proteus OX19*. He stated that a drop of finger blood was quite enough for the Weil-Felix test and that rapid bedside diagnostic tests were very helpful in field conditions.

KUHN discussed chemotherapy; he said that the chemical structure of chemotherapeutic substances was often of minor importance and mentioned 4, 4′-diaminobenzol as an example of a sulphur-free drug which might be found to have a stronger "sulphonamide effect" than the sulphonamides themselves.

MRUGOWSKY spoke of the possibility of predicting epidemics of typhus by a study of the periodic cycle of occurrence of severe outbreaks. He mentioned the examples of typhoid fever and diphtheria, which have a thirty-year periodicity, and scarlet fever, which has its peak of incidence at seven-year intervals.

SCHMIDT spoke of recent advances in the concentration of antibodies in general by electrophoresis, and by an enzymatic process by which a serum containing 1,000 units per cc. can be purified and concentrated so as to contain 80,000 units. The ideal aimed at is to obtain a pure crystalline antitoxin, free from all the albuminous substances.

HAAS dealt with the need for further light on the relationship between the chemical structure and the specific action of each antigen, and said that the pneumococcus antigen had already been prepared synthetically.

WOHLRAB referred to the close relationship between the Rickettsiae of typhus and trench fever. *John W. D. Megaw.*

ALICATA (J. E.) & BREAKS (Virginia). **Typhus Fever in Honolulu: certain Epidemiologic Aspects.**—*Hawaii Med. Jl.* 1942. Nov.–Dec. Vol. 2. p. 59. [Summary taken from *Jl. Amer. Med. Assoc.* 1943. May 22. Vol. 122. No. 4. p. 257.]

"Alicata and Breaks state that a strain of local human typhus has been found to be clinically and immunologically identical with that of the local rat and Wilmington strains of endemic typhus. Typhus developed in 73 of 249 guinea pigs inoculated with the brain emulsion of 600 rats trapped in various districts of Honolulu. Assuming that 1 infected guinea pig represented at least 1 infected rat, 73 (12·1 per cent.) of the rats harbored typhus virus in the brain. Of the rats trapped in seven districts of Honolulu the highest incidence of typhus infection was in rats from Kaimuki, down-town and Kalihi districts. The same districts also showed the highest incidence of human infection: 202 cases in five years. The surroundings of 43 of 50 of the patients were infested with rats. Typhus virus was found in the brain of 8 rats trapped in seventeen residences in which human typhus had occurred recently. As a result of guinea pig inoculation no typhus virus was found in the brain and fleas of 6 cats and the fleas of 1 dog from four residences with cases of human typhus. Similarly there was no virus in the brain of 109 cats and 26 dogs obtained at random from various parts of Honolulu."

MENDOZA (Lázaro). Tifus exantemático en el Salvador. [**Typhus in Salvador.**]—*Mem. d. V Congr. Méd. Centroamericano, San Salvador, 5–12 Nov., 1938.* pp. 749–760.

Nine sporadic cases of a typhus-like fever were observed in the neighbourhood of San Salvador since 1937. The fever lasted 15 to 18 days; the onset was sudden, with severe pains in the limbs, suffusion of the face, and injection of the conjunctivae. The fever was continued, but with morning remissions; it ended by rapid lysis. There was a generalized macular rash which had a distinct tendency to be petechial. There was no stupor and all the patients recovered. Louse infestation was said to have been excluded, and there was no history of tick bite. Some of the houses in which the patients lived were rat-infested.

In one case the Weil-Felix reaction to *Proteus OX19* was positive 1–80; in another, 1–500. In two others there were fleeting, doubtfully positive reactions, 1–200.

Suspensions of head lice collected from one patient towards the end of the attack were injected intraperitoneally into a guineapig whose blood was later injected into three rats, all of which died; one of them had a pronounced scrotal reaction. Smears from the lice contained Rickettsia-like bodies. The disease was regarded as a flea-borne fever of the typhus group. [See this *Bulletin*, 1943, Vol. 40, p. 136.] *John W. D. Megaw.*

EDMUNDO VÁSQUEZ (Luis). Mi contribución a la búsqueda del tifus exantemático en el Salvador. [**Enquiry into Typhus Exanthematicus in Salvador.**]—*Mem. d. V Congr. Méd. Centroamericano, San Salvador, 5–12 Nov., 1938.* pp. 763–785. [22 refs.]

A clinical description is given of 13 cases of a fever resembling those described in the preceding abstract. These also occurred in the vicinity

of San Salvador. One group of three patients had lived in the same house; the onset of the fever was on the 23rd July, 13th August and 22nd August in these cases; all the others were entirely disconnected in their occurrence.

The Weil-Felix reaction was positive in titres of 1–80 and 1–320 respectively in two of the 10 cases in which it was carried out. Among the eight patients with negative reactions were the three who lived in the same house.

The author is strongly inclined to the view that the fever belongs to the typhus group and that it is of the murine type; he appears to regard murine typhus and Brill's disease as being different names of the same fever. He considers, however, that the disease will have to be investigated by laboratory methods before a final conclusion is reached with regard to its nature, and he states that there are plenty of fleas, ticks, and rodents, in the affected localities.

He also believes that the fever has appeared recently in Salvador because before the year 1936, when the first case was seen, no fever resembling typhus had been observed by himself or other physicians of that country. *John W. D. Megaw.*

FLOCH (H.). Fièvre typho-exanthématique à Cayenne. [**Exanthematic Typhus Fever in Cayenne.**]—*Bull. Soc. Path. Exot.* 1942. Jan. 14 & Feb. 11. Vol. 35. Nos. 1–2. pp. 18–20.

A case of typhus-like fever of uncertain vector is briefly described. The patient, an Arab aged 41 years, had fever lasting about 14 days. The onset was gradual; a discrete rash appeared all over the body, except the face and hands, about the sixth day. The special feature was the occurrence of orchitis and epididymitis during the fever and the subsidence of the condition with the fall in temperature.

The Weil-Felix reaction to *Proteus OX19* was positive, 1–400, and the blood of the patient, inoculated intraperitoneally into a guineapig, caused a fleeting rise of temperature with slight oedema and redness of the scrotum.

The author suggests that the case was one of murine typhus or of tick typhus. *John W. D. Megaw.*

TRAVASSOS (J.) & VALLEJO-FREIRE (A.). Sôro anti-rickettsia na febre maculosa experimental. [**Anti-rickettsial Serum in Experimental Spotted Fever (of the Tick-borne São Paulo Type).**]—*Mem. Inst. Butantan.* 1942. Vol. 16. pp. 285–307. With 10 graphs. [20 refs.] English summary.

The experiments described in this paper were in continuation of the work of MONTEIRO who, at the Butantán Institute in 1931, showed that the serum of sheep immunized by inoculation of Rickettsiae had a neutralizing action on the virus *in vitro*. TOPPING, in 1940, obtained a hyperimmune serum in rabbits inoculated with suspensions of ticks infected by the Rickettsiae of Rocky Mountain spotted fever; this serum was found to have a pronounced curative effect.

In the present experiments rabbits were inoculated with the blood of guineapigs infected with Rickettsiae of the São Paulo type; infected *Amblyomma cajennense* were allowed to feed on the rabbits and, after a resting period of two months, the animals were repeatedly inoculated with progressively increasing doses of suspensions of infected ticks, and also were subjected to the bites of infected ticks. Blood samples

were taken by cardiac puncture and the serum was concentrated by Felton's method. Full details of the technique and the results of the experiments are given.

Controlled experiments on guineapigs showed that the serum (1) neutralized the virus, both *in vitro* and *in vivo* ; (2) conferred passive immunity for about one week ; (3) prevented infection when injected during the incubation period, and (4) had a curative action during the first days of the fever.

The curative action is shown by the fact that of 16 treated animals, 12 survived a heavy inoculation with Rickettsiae, whereas of 16 controls only one survived. Preliminary experiments show that a protective serum can be prepared by hyperimmunizing horses, and a report on this work is promised. *John W. D. Megaw.*

PARKER (R. R.) & STEINHAUS (Edward A.). **American and Australian Q Fevers: Persistence of the Infectious Agents in Guinea Pig Tissues after Defervescence.**—*Public Health Rep.* 1943. Mar. 26. Vol. 58. No. 13. pp. 523–527.

Rickettsiae of American Q fever were recovered from the kidneys of infected guineapigs up to 54 days after inoculation, from the spleen up to 32 days, from the lungs and brain, up to 26 days.

Rickettsiae of Australian Q fever were recovered from the spleen and kidneys of infected guineapigs up to 120 days, from the urine up to 110 days, from the testes and seminal vesicles up to 100 days, from the liver up to 60 days, from the lungs up to 30 days, and from the brain up to 15 days, after inoculation.

In both sets of experiments the Rickettsiae were repeatedly and consistently recovered from the kidneys up to the end of the periods covered by the investigations, 54 and 120 days respectively, so that the end points were not reached, and the kidneys probably would have been found to harbour the infection for longer periods. In the case of the other organs and of the urine the findings were less consistent ; negative results were often interspersed with positive.

Australian Q Rickettsiae were injected *via* the urethra and vagina into several guineapigs, all of which became infected. This finding and the persistence of Rickettsiae in the seminal vesicles suggested the possibility of transmission of infection during copulation, but in tests on 19 female guineapigs only one became infected after copulation with an infected male, and in this case there was no evidence that the act of copulation was responsible for the positive result.

Samples of urine from a patient suffering from American Q fever were tested on the third day after the onset of the fever, and 1, 9, 15, and 22 days, after defervescence. All the samples gave negative results. *John W. D. Megaw.*

BARTONELLOSIS.

WEISS (P.). Sobre inmunidad en la verruga peruana. [**Immunity in Verruga Peruviana.**]—*Rev. Méd. Peruana.* 1941. Apr. Vol. 13. No. 148. pp. 109–115.

In Carrión's disease we have a condition which in most cases confers permanent immunity, but in some goes on to a chronic process with

alternating improvement and deterioration which may continue for years. Animal reservoir hosts are immune and their immunity has been regarded as a form of premunition. The disease may be divided into two stages: the *haematic phase* of invasion before any anaemia is produced. This is a "septicaemic stage" and is followed by extension to the reticulo-endothelium and carriage to the tissues, the *histioid phase*. As a result the first red cells are destroyed (hence the secondary anaemia) and taken up by the reticulo-endothelial cells, the Kupffer cells and the lymphatic tissue in the spleen.

The author does not regard the erythrolysis as a toxic phenomenon but as defensive, and the time of danger is when the Bartonella are disappearing from the blood corpuscles, that is at the beginning of the histioid phase. It is believed that the organism—the Bartonella—multiply during the haematic phase in the red cells. The destruction of corpuscles and active regeneration are both caused by the presence of the organism in the blood. *H. Harold Scott.*

WEISS (P.). Contribución al estudio compárado de las Bartonellas. [**Contribution to the Study of Bartonellosis.**]—*Rev. Méd. Peruana.* 1941. Apr. Vol. 13. No. 148. pp. 116–125. With 3 figs. & 3 charts. [34 refs.]

Human bartonellosis has comparatively restricted geographical limits, Peru, Ecuador and Colombia, or the Andes between 2°N. and 13°S. and only occurs in certain parts of this area, whereas animal bartonellosis seems to be much more extensive, perhaps having a worldwide distribution.

Severe forms of the disease in man are characterized by a "regenerative macrocytic hypochromic anaemia" identical with that resulting in animals (dogs) splenectomized after infection. In man the reticulo-endothelial proliferation may result in verruga; such is not met with in animal infection. Of the forms of the organism, coccoid, bacillary and what the author calls "hirsute," the last is like a violin-bow with structure resembling an undulating membrane, or beginning of growth of lateral branchings. These seem to be peculiar to the organism in the dog. Another characteristic of *Bartonella bacilliformis* is its resistance *in vitro*; infected blood and verruga nodules will contain virulent and cultivable organisms after "a long time" at room temperature and even in the ice-box, but the dog form is labile and under these conditions has disappeared from the blood in five days, so that it is no longer virulent. Lastly, animal bartonellas are susceptible to arsenicals such as salvarsan or to Bayer SDT 386B, an antimonial compound, whereas *B. bacilliformis* is not, nor is it affected by any drug at present known. *H. Harold Scott.*

DELGADO BEDOYA (G.). Endo Flebitis verrucosa. [**Phlebitis in Verruga Peruviana.**]—*Rev. Méd. Peruana.* 1941. Apr. Vol. 13. No. 148. pp. 126–138.

Dr. Dámaso ANTÚNEZ in 1940 wrote that "Between the severe forms of Oroya fever and the ordinary verruga with fever there is another characterized by fever and severe pain, without much anaemia, followed by phlebitis of the leg and thigh." The author divides phlebitis into surgical, obstetrical and medical categories, and describes

its pathology [as given in text-books] and then relates a case which was for a time puzzling. The patient was a man of 36 years complaining of severe lumbar pain, worse at night, on movement of the spine and on coughing. He had a bad history: syphilis in the past, was a heavy indulger in alcohol, tobacco and coca, and his mother had died of alcoholism. Wassermann reaction was negative but Kahn was +++. Later, his left leg swelled and the calf became painful. Diagnosis was long in doubt and treatment varied but unavailing, until the former was solved by the appearance of a verruga eruption on the face and arms. At the same time the pain and swelling began to subside; the verruga ran its course in 24 days and the patient left hospital.

The author suggests the pathogeny to be that the verruga organism settles in the reticulo-endothelium, and sets up degenerative and exudative processes, succeeded by proliferation of the intima and venous obstruction. [As usual in Spanish papers, the discussion on the diagnosis of a swollen limb includes phlegmasia alba dolens, regardless of the sex of the patient.] *H. Harold Scott.*

YELLOW FEVER.

HUGHES (T. P.). **The Reaction of the African Grivet Monkey** (*Cercopithecus aethiops centralis*) **to Yellow Fever Virus.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1943. May. Vol. 36. No. 6. pp. 339–346.

The grivet monkey, *Cercopithecus aethiops centralis* Neuman, is one of the most ubiquitous mammals in the East African zone of yellow fever endemicity, and occurs commonly in Uganda, the Belgian Congo, Anglo-Egyptian Sudan, and other parts of the Ethiopian region. These monkeys are migratory and travel in small troops, and if capable of circulating yellow fever virus in a concentration sufficient to infect mosquitoes, might distribute infection throughout the range of migration.

It has already been found by FINDLAY, KIRK and MACCALLUM (see this *Bulletin*, 1942, Vol. 39, p. 455) that about 20 per cent. of these animals caught in two areas of yellow fever endemicity contain yellow fever antibodies. The present article deals with the reactions following the injection of pantropic virus, the bites of infected mosquitoes, and the injection of neurotropic virus.

Ten monkeys were inoculated intraperitoneally each with 1 cc. of Asibi serum virus in varying dilutions, and their sera was tested for virus by intracerebral injection of mice; eight showed circulating virus in the serum and five died. Two showed no signs of infection; nor did a third inoculated with rehydrated virus. In addition seven monkeys were exposed to the bites of infected Aëdes, one to *Aëd. metallicus*, and six to *Aëd. aegypti*, and all showed circulating yellow fever virus. The titre of circulating virus varied from 3,300,000 to 10,428,000 m.l.d. per cc. in the monkeys injected with virus, and from 1,666 up to 330,000,000 m.l.d. per cc. in those bitten by infected mosquitoes. Four monkeys inoculated with neurotropic virus in its 619th serial mouse passage gave completely negative results.

The results show that certain individuals of this species of monkey are capable of circulating yellow fever virus in high concentration, but there is a marked variation in susceptibility and in the titre of

virus. It seems probable that this primate may serve as another link in the chain of circumstances resulting in the spread of yellow fever to man. *E. Hindle.*

Fox (J. P.). **Immunity to Yellow Fever Encephalitis of Monkeys and Mice immunized by Neural and Extraneural Routes.**—*Jl. Exper. Med.* 1943. June 1. Vol. 77. No. 6. pp. 487–506. [46 refs.]

The author discusses the problem of producing an effective active immunity to viruses which attack the central nervous system, and gives details of experiments supporting the view that the problem of immunizing the nervous system against a neurotropic strain of yellow fever virus is not dissimilar from that concerning primarily neurotropic viruses.

Monkeys and mice surviving cerebral infection with yellow fever virus were found to resist large doses of highly neurotropic strains of yellow fever virus. These animals, however, did not resist more than very small doses (approx. 10 m.l.d.) of Eastern equine encephalomyelitis inoculated intracerebrally.

Animals immunized as the result of an ordinary systematic infection, or by other extra-neural routes, were not uniformly resistant to neural infection with neurotropic virus. Monkeys which had undergone systematic infection with virus of the avirulent 17D strain, or of various jungle strains, resisted only small intracerebral doses of neurotropic virus ; while mice, even when hyperimmunized, showed only irregular resistance to similar intracerebral inoculations.

This difference in the immunity of animals, as the result of either neural or extra-neural methods, is not related to similar differences in the levels of protective antibodies in the sera. Actually the average titre of the hyperimmune mice was several times that of animals immunized as the result of an intracerebral infection.

A possibly significant relation was found to exist between the resistance of mice to neural infection and the content of protective antibody in the brain. The protective activity of brain suspensions from mice surviving cerebral infection was found to be several times that of brain suspensions from hyperimmunized animals.

The author is of the opinion that the superior resistance to neural infection of animals whose immunity results from a previous non-fatal infection of the nervous system is effected by a specific local mechanism which is based at least in part upon an increased concentration of antibody in the cerebral tissue. *E. Hindle.*

Fox (J. P.). **Non-Fatal Infection of Mice following Intracerebral Inoculation of Yellow Fever Virus.**—*Jl. Exper. Med.* 1943. June 1. Vol. 77. No. 6. pp. 507–520. [17 refs.]

An account of experiments with various strains of yellow fever virus, showing that specific but non-fatal infections may occur among mice inoculated intracerebrally with the virus.

Material for the initial study of non-fatal infections with virus 17 D was obtained by collecting all mice used in routine vaccine titrations which had shown any signs of illness and which were still alive on the 22nd day after inoculation. In all 543 mice were collected ; 240 of these were tested for resistance to reinfection by intracerebral inoculations of virulent virus and only 22 failed to survive. The occurrence

of completely inapparent infections with virus 17 D was also shown to occur. The proportion of non-fatal infections was found to be related to the virus dose and to the substrain of 17 D used. Small doses produced a significantly higher proportion of non-fatal infections than larger doses, and different sub-strains of virus 17 D varied greatly in the proportion of infections not ending in death.

Observations with other strains of yellow fever virus show that in the case of the French neurotropic strain and the pantropic Asibi strain, inapparent infections, though occurring occasionally, are too infrequent to be of quantitative importance. On the other hand, freshly isolated strains from Brazilian cases of jungle yellow fever present quite a different picture, and the author gives the results of the inoculation into mice of seven strains isolated from patients in 1940 during an outbreak in Espírito Santo. Out of 100 mice inoculated only 62 developed fatal infections ; and of 20 survivors reinoculated intracerebrally with French neurotropic virus, 17 resisted infection. Out of seven serum pools, each from 1 to 4 mice, four showed protective powers, one was weakly positive, and two negative.

It is evident that with these jungle strains the demonstration of non-fatal infections is essential in any measure of the level of infectivity of virus preparations. *E. Hindle.*

PLAGUE.

Cossio (Pedro). Peste. [**Plague (in Argentina).**]—*Bol. Sanitario.* Buenos Aires. 1942. Apr.–June. Vol. 6. Nos. 4–6. pp. 167–168.

The number of cases of plague in 1941, 52 in all, is four times less than in the previous year, a result which must be attributed primarily to the antiplague measures adopted, especially in the province of Córdoba (Argentine). Another remarkable fact is the very low mortality (60 per cent. as against 90 per cent.) in this year, which seems to have been due solely to the use, for the first time, of sulphonamides in treatment. *W. F. Harvey.*

Alberto Alvarado (Carlos). Peste Zona Norte. [**Plague. North Zone (Argentina).**]—*Bol. Sanitario.* Buenos Aires. 1942. Apr.–June. Vol. 6. No. 4–6. pp. 169–171.

The intense endemic infection with plague of sylvatic rodents in the whole Northern Zone (Argentine) had its sequel in the occurrence in 1940 of human plague (138 positive cases and 37 suspected, as well as unrecognized cases), which was followed by an extraordinary decline in 1941. In the course of the campaign of control 1,230 houses were visited, 2,751 rodents captured and 24 found dead, 28,719 arsenical baits were distributed, etc. *W. F. Harvey.*

SAVINO (Enrique) & RIESEL (Marcos A.). Casos de peste en la provincia de Jujuy. (Relato de una misión sanitaria.) [**Cases of Plague in Jujuy. Report of a Sanitary Mission.**]—*Bol. Sanitario.* Buenos Aires. 1942. July–Sept. Vol. 6. Nos. 7–9. pp. 375–389. With 14 figs. & 2 maps.

The cases of plague referred to arose in La Esperanza and Agua Salada of the province of Jujuy (Argentina). Investigations were taken up rather late after the patients had died. Domestic rats found were mostly *Rattus alexandrinus*, while the sylvatic rodents, besides the cuis (*Galea musteloides*), were chiefly *Holochilus balnearum*. On the rats the fleas found were *X. cheopis* and on Holochilus the flea *Rhopalopsyllus byturus*. The epidemiology of the outbreak is not at all clear: the disease was proven plague in the human beings; dead rats and the sylvatic rodents were examined, but in no case was plague infection demonstrated. *W. F. Harvey.*

BOLETIN SANITARIO. Buenos Aires. 1942. July–Sept. Vol. 6. Nos. 7–9. pp. 459–465. With 8 figs.—Inspección sanitaria realizada en el Puerto de Quequen y zonas adyacentes. [**Sanitary Plague Inspection of the Port of Quequen and Neighbourhood.**]

Investigation was made into the occurrence of plague in Quequen (Argentine). It was found that between November 1941 and April 1942, the number of plague rats had steadily declined from 16·4 per cent. to 2·2 per cent. of those examined. The conclusions arrived at are in the main that this introduction of plague coincided with the height of the epizootic in rats, that it could be traced to the grain traffic by rail into the port and that there were many clues to show how intimate was the contact of the grey rat with the sylvatic rodents—the cuis. Thus, besides direct observation of this association, a flea of the grey rat (*Nosopsyllus fasciatus*) was found on the cuis, *Galea leucoblephara*, and cuis were found among the grain stores in the port itself. It is also quite possible that a rat epizootic had existed in the railway stations distant from the outbreak, as evidence of dead rat remains was forthcoming. *W. F. Harvey.*

ALONSO MUJICA (Juan Carlos). La peste y su profilaxis en la República del Perú. [**Plague and its Prophylaxis in Peru.**]—*Bol. Sanitario.* Buenos Aires. 1942. July–Sept. Vol. 6. Nos. 7–9. pp. 475–485.

Observations which are here recorded refer to plague in both Peru and Ecuador. The difficulties of antiplague measures are much the same in both countries: these refer to the modes of life, customs and mentality of the people, who are obstructive to all measures of hygiene, indulge in elaborate funeral ceremonies and are wont to resort to quacks and diviners. An outstanding character of the people is their close contact with and constant traffic in cuis (*Capis aperea*), animals highly susceptible to plague and sometimes even the cause of an initial epizootic in distant places to which they have been consigned. Peru has regional laboratories in charge of a practical observer who is concerned with the classification of rats, their autopsy and the removal of a portion of spleen to be sent to the bacteriological laboratory in Lima. Rats are classified into the groups: (*a*) fresh and apparently healthy, (*b*) those with suspicious lesions, and (*c*) rats in a state of putrefaction. As bait for trapping 15 per cent. white arsenic is used,

barium sulphate having been abandoned as being much less practical than arsenic. The cereal vehicle of the bait is varied according to circumstances. In Ecuador the Institute at Guayaquil has carried out autopsies on captured rats and classified them according to sex and species. Some of the results of prolonged observations are worthy of note: (1) The Norwegian rat predominates to the extent of 75 per cent., and when this proportion of *Rattus norvegicus* approaches equality with other species, "*it can be affirmed that the total rat population of the place has definitely decreased*," an indication of unusual rat mortality. (2) The proportion of female rats to male is usually as five to one and when this proportion of captured rats approaches equality "*it can be affirmed that the total rat population of the place has definitely decreased.*" (3) The good general health of the rats (freedom from parasites and other infectious processes) "*is the usual index of decrease of the rat population.*" (4) When the known trapping index value exceeds 5 per cent. [that is, presumably, when plague is found in more than 5 per cent. of trapped rats] there is reason for alarm and increase of effort. Observations such as these, and those on the rat-flea index, have proved of great value in demonstrating the existence of rat plague and also in forecasting the possibility of the outbreak of plague.

W. F. Harvey.

DOUDOROFF (M.). **Studies on the Nutrition and Metabolism of** *Pasteurella pestis.—Proc. Soc. Experim. Biol. & Med.* 1943. May. Vol. 53. No. 1. pp. 73–75.

Valuable data on nutrition and metabolism are being accumulated by using bacteria as the testing organism for basal food requirements and accessory growth factors. The plague bacillus has been studied by RAO [this *Bulletin*, 1939, Vol. 36, p. 963; 1940, Vol. 37, p. 826]. Doudoroff has used the same organism and has formulated noteworthy conclusions: (1) "Cystine could be replaced with thiosulfate, sulfite, thioglycollate, or homocystine, but not with methionine. (2) Phenylalanine normally supported maximum development at a concentration of 0·0002% but the bacteria could be 'weaned' from this requirement to develop at almost their normal rate without it . . . (3) With cystine and phenylalanine added to the medium, mannitol was found to be almost as good a carbon source as glucose . . . . (4) Amino acids were in general no more satisfactory as nitrogen sources than were ammonium salts . . . . (5) Certain amino acids were inhibitory to growth when added to simplified media . . . . (6) Very heavy cultures . . . could be obtained in synthetic media with glucose and small amounts of cystine and phenylalanine if adequate aeration was provided by constant agitation . . . . (7) Strain 1122 was capable of development under completely anaerobic conditions in complex media containing glucose . . . ."

W. F. Harvey.

PRINCE (F. M.). **Species of Fleas on Rats collected in States West of the 102D Meridian and their relation to the Dissemination of Plague.—** *Pub. Health Rep.* Wash. 1943. Apr. 30. Vol. 58. No. 18. pp. 700–708.

A total of 4,188 rats, collected by trapping and shooting (1935–1941), and their fleas, in 13 States, provided the material for study. The rats examined were the three common species *R. norvegicus*, *R. rattus* and

R. alexandrinus and altogether 21 species of flea are listed, of which the most commonly found in coastal cities were *Xenopsylla cheopis*, *Nosopsyllus fasciatus* and *Leptopsylla segnis*. Most of the fleas not ordinarily regarded as truly rat fleas probably came from those field rodents which are to be found "around human habitations in rural areas and around city garbage dumps," or were acquired in field rodent burrows occasionally used by rats. No plague was found among the rats collected in the surveys here considered but "nine of the species of fleas collected . . . have been found capable of transmitting plague under experimental conditions by biting hosts on which they do not occur in nature." The common rat flea *Leptopsylla segnis*, even when proved to be infected experimentally, did not transmit the infection under the conditions of testing.

Plague infection has been demonstrated in wild rodents of 12 Western States. It has been shown that city rats will migrate as far as four miles and that contact between urban rats and sylvatic rodents is feasible. It seems possible that fleas of the sylvatic rodents are now finding their way to rats in or near centres of population of coastal towns. Isolated specimens of plague-infected *R. norvegicus* were discovered in 1941 in San Francisco for the first time since 1908, although thousands of rats had been examined in the interval every year. "Should the infection spread from the wild rodents to the urban rats it is possible that serious outbreaks of human pneumonic plague might occur." *W. F. Harvey.*

PONS (R.). Rats porteurs sains de bacilles de Vignal-Malassez. [**Healthy Rats Carriers of the Vignal Malassez Bacillus.**]—*Bull. Soc. Path. Exot.* 1942. Jan. 14 & Feb. 11. Vol. 35. Nos. 1–2. pp. 49–51.

A cocco-bacillus, non-motile, Gram-negative and pathogenic for mice, was isolated from one of five captured and apparently healthy rats. It was, to begin with, pathogenic by subcutaneous inoculation to the guineapig, but gradually lost its virulence, and it was not at any time pathogenic for the rat. In cultural characters it resembled, in some respects, the bacillus of plague. It is identified as a species isolated by VIGNAL-MALASSEZ in the pseudotuberculosis of rodents and may easily lead to error of diagnosis in rodent plague.

W. F. Harvey.

POLLITZER (R.) & LI (C. C.). **Some Observations on the Decline of Pneumonic Plague Epidemics.**—*Jl. Infect. Dis.* 1943. Mar.–Apr. Vol. 72. No. 2. pp. 160–162.

A rather characteristic outbreak of primary pneumonic plague has been investigated by the authors from the point of view of natural decline. In this case a patient returned to his own home; developed high fever, cough and bloody sputum; had no bubo; gave rise to an infection, which wiped out not only his immediate family and involved two other households in a small village, but was carried by relatives to five other settlements. The point stressed is that with the carriage of plague to the other settlements its symptoms altered somewhat and, in particular, bloody frothy sputum, the usual vehicle of infection, was absent. This feature is correlated, from post-mortem observations previously made, with the presence of only slight and ill-defined pneumonia foci in cases which were, otherwise, pneumonic plague. In the present instance "infection never resulted from contact with

patients having neither bloody sputum nor cough" and it is concluded that this may be an intrinsic factor in the decline of epidemic pneumonic plague. *W. F. Harvey.*

GIRARD (G.) & ROBIC (J.). L'état actuel de la peste à Madagascar et la prophylaxie vaccinale par le virus-vaccin E. V. [**The Present State of Plague in Madagascar; Prophylactic Use of the E. V. Vaccine.**]—*Bull. Soc. Path. Exot.* 1942. Jan. 14. & Feb. 11. Vol. 35. Nos. 1–2. pp. 42–49. With 1 chart.

The two authors have written many articles during the last 20 years on plague as it prevails in the high plateaux of Madagascar. In the present article the account of prophylactic treatment with the well known E.V. attenuated living vaccine and the reduction of plague incidence is brought up to 1941. A remarkable graph shows how this occurred, with the reduction proceeding from 3,493 in 1933–34 to 450 in 1940–41. During this time no change has occurred in the flea fauna of the rats. In 1940, 2,357 *Xenopsylla cheopis* were counted on 474 captured rats, an index of five per rat. This is the flea species which predominates; other species are *Ctenopsylla musculi* and *Synopsyllus Fonquernii*. Rats too are sometimes literally covered with the chigger *Echidnophaga gallinacea* [the sticktight flea]. Vaccination, when it reached 90–95 per cent. of the population, prevented the development of epidemic plague, but it has not yet caused the complete disappearance of plague from Madagascar.

W. F. Harvey.

FINSTERWALDER (C.). Aus dem Pestlaboratorium des Hygienischen Instituts Hamburg. [**The Plague Laboratory of the Hygiene Institute, Hamburg.**]—*Arch. f. Hyg. u. Bakt.* 1943. Vol. 129. No. 1/6. pp. 61–65.

BACILLARY DYSENTERY.

BULMER (E.) & PRIEST (W. M.). **Bacillary Dysentery: Chemotherapy in its Treatment: an Experience of 492 Cases in the Middle East.**—*Lancet.* 1943. July 17. pp. 69–71.

In a previous paper [this *Bulletin*, 1943, Vol. 40, p. 395] the results of a nine months' trial of sulphaguanidine treatment for bacillary dysentery were published. These have now been confirmed by a further and equal period, during which experiments have also been carried out with sulphanilamide and sulphapyridine. A table summarizes the clinical material upon which these observations have been made:—

	Cases	Percentage
Amoebic dysentery, including hepatic amoebiasis	36	1
Acute catarrhal enteritis	2,313	55
Bacillary dysentery	1,829	44

(Of Positive isolations Flexner 70%, Shiga 19%, Sonne 6%, Schmitz 5%).

Treated with Sulphaguanidine ...	323
Treated with Sulphapyridine ...	97
Treated with Sulphanilamide ...	63

"In the Middle East bacillary dysentery has not been of a severe type and most cases would have probably recovered on expectant treatment."

The diarrhoeal cases (other than amoebic dysentery) reported are classified as follows, according to severity :—

	Cases	Type	Percentages
Acute catarrhal enteritis	2,313	Mildest	56
Bacillary dysentery	1,829	Mild	20
		Moderate	22
		Severe	2

In the middle of 1941 the classical purgative treatment was abandoned—as scientifically irrational—with resulting increased comfort to the patients. In nearly 500 patients some form of sulphonamide has been given, and in only eight Shiga cases was serum administered, since the results with sulphaguanidine usually rendered this unnecessary.

Sulphaguanidine became available in April 1941. A standard dosage was adopted irrespective of body-weight. The maximum total dosage was 350 gm. ; the average 100 gm., but it is concluded that if cases can be treated in the earliest stages, 30–40 gm. will suffice. The initial dose was 6 gm., followed by 3 gm., four-hourly until the stools were three daily ; thereafter the drug was continued in the same daily dose for two or three days. It has repeatedly been demonstrated that relapses occur if the drug is stopped too soon.

The patients treated with sulphaguanidine are divided into two groups—selected and unselected ; 232 cases were carefully selected for treatment with sulphaguanidine. The average duration of stay in hospital was 17 days for the 205 acute cases in this group—a figure which contrasts with the average of 20 days for a random sample of 600 cases, mostly treated on other lines. There were two deaths, giving a fatality rate of 0·1 per cent. ; in neither case could the fatal result be attributed to failure of sulphaguanidine. Only two of the patients were invalided home. About 95 per cent. of the whole group recovered completely, and their response to the drug was proof of its specific action. The average number of stools was at the beginning of treatment 16, but by the fifth day it had fallen to 2–3. More striking still was the improvement in the patients' general condition. In 43 cases treatment was commenced within three days of onset. The average number of stools at the beginning was 20 and had fallen to 2 on the fifth day. The average total dose was 90 gm.

In less severe cases and in enteritis, sulphaguanidine was equally effective, and it reduced the stay in hospital to 6 days after a dosage of 26 gm., contrasting with a figure of 10 days in 600 controls.

Two patients with non-specific ulcerative colitis whose histories extended back prior to the war, failed to show any improvement when sulphaguanidine was given by rectal instillation as well as orally.

Among the 323 cases treated with sulphaguanidine, often in large doses (up to a total of 350 gm.) very few examples of toxicity have been found. The drug does not upset the patient more than does kaolin. In four patients there were rubelliform rashes about the 10th day. There was one "sulphaguanidine kidney," which cleared up after

2 pints of 4·285 per cent. sodium sulphate had been given intravenously.

A series of 97 cases was treated experimentally with sulphapyridine on similar indications. The conclusions reached were that it was almost as effective as sulphaguanidine, but was less desirable on account of the nausea, vomiting and general malaise produced. The average total dosage was 20 gm. One patient developed a " sulphapyridine kidney " but recovered. With sulphanilamide (average dose 20 gm.), which was tried in 63 patients at a time when supplies of sulphaguanidine were restricted, the results were not good. *P. Manson-Bahr.*

CLAY (A. C.). **Chemotherapy of Intestinal Infections treated with Sulphonamide Compounds.**—*Brit. Med. Jl.* 1943. July 10. pp. 35–36. [16 refs.]

During 1941 and the first half of 1942, 273 cases of bacillary dysentery (all proved bacteriologically) were treated in the City Hospital, Aberdeen. Of these 140 cases were treated on general lines with salines ; 83 with sulphaguanidine ; 50 with sulphanilamide.

Stools were examined bacteriologically twice weekly and the blood sedimentation rate estimated on admission and on the completion of the course. The infections were mostly Flexner and Sonne, on the whole of a mild character, with seldom more than 5 or 6 stools a day, some of which contained blood and mucus. A low-grade pyrexia and minor signs of dehydration with occasional vomiting were observed in the 140 patients who received no chemotherapy. Out of 24 who could be described as acutely ill, six died (two deaths being attributable to intercurrent disease).

Whenever necessary, fluid was given intravenously in the form of glucose-saline, but, as far as possible, patients were encouraged to take fluids by the mouth, in quantities of 8–10 pints in 24 hours for adults, proportionately less for children.

Those receiving sulphaguanidine were given a five-day course, the dosage being calculated for the body weight ; the initial loading dose during the first 24 hours was 0·5 gm. per kilo., and this was followed by a maintenance dose of 0·1 gm. per kilo. for the next four days. Those receiving sulphanilamide were given a dosage amounting to half the quantity of sulphaguanidine. The tablets were powdered and administered in milk four-hourly for the first 24 hours and three times daily for the next four days.

The stay in hospital and the number of days during which the stools remained positive were reduced by half in the sulphaguanidine-treated cases as compared with those receiving no chemotherapy, except in the case of Sonne convalescent carriers, in which both the stay in hospital and the number of days they remained bacteriologically positive were slightly increased. *P. Manson-Bahr.*

WEST (Robert F.). **Bacillary Dysentery : some Results and Conclusions from a Series of Patients treated with Sulphaguanidine.**—*Med. Jl. Australia.* 1943. Apr. 17. 30th Year. Vol. 1. No. 16. pp. 344–347.

This paper, which follows much the same lines as many others recently reviewed in this *Bulletin*, is based on a survey of patients suffering from " diarrhoea " in hospital over a period of three months from March 1st to May 30th, 1942. All those suffering from diarrhoea

were admitted to a special department and segregated into the categories of non-specific enteritis, bacillary dysentery (acute and chronic), and amoebic dysentery.

Great importance is attached to sigmoidoscopy as an aid to diagnosis, not so much in the early stages of acute cases, as in chronic bacillary dysentery, in which it is the essential means; "it is also the only method of making a diagnosis in mild or otherwise doubtful cases." In treatment it was also used and in this series a sigmoidoscopic examination was carried out every third day to watch the progress of the pathological condition and to note the effects of treatment.

The control patients were treated with sodium sulphate. Amongst 279 cases of diarrhoea admitted there were 167 of acute bacillary dysentery, 12 of amoebic dysentery and 100 of non-specific enteritis. Owing to limitation of bed-space complete treatment was given to 97 only of the 167 patients with bacillary dysentery; the rest were treated for periods of 24 to 72 hours and evacuated when sufficiently improved. The older methods of treatment proved unsatisfactory and unreliable; for instance, the days on which the stools first became normal were, for saline therapy the 15th day, and for sulphaguanidine the seventh day. The days on which sigmoidoscopic appearances became normal were, for saline therapy the twentieth, and for sulphaguanidine the twelfth. Thus the period of hospitalization was 12 days for sulphaguanidine as against 21 for patients on saline therapy.

In the sulphaguanidine series of 74 there were six cases of arthritis. In all it proved to be monarticular, and only in one instance affected a previously damaged joint. A severe complication due to sulphaguanidine was constipation, which occurred in 15 per cent. of cases and was of such a degree as to cause anxiety. Headache and dizziness occurred in 4 per cent. Pyrexia from the 7th to the 10th day was the result of large dosage and subsided on stoppage of sulphaguanidine. A multiform rash was noted in 4 per cent.

Sulphaguanidine treatment is so uniformly good that it should be used in all cases, whether mild or severe.

Because patients suffering from acute bacillary dysentery travel badly, sulphaguanidine treatment should be commenced at the furthest forward point in the line of evacuation.

Treatment should be controlled by sigmoidoscopy and the criterion of cure is a normal mucosa, without which no patient should be discharged as cured. *P. Manson-Bahr.*

SMYTH (C. J.), FINKELSTEIN (M. B.), GOULD (S. E.), KOPPA (T. M.) & LEEDER (F. S.). **Acute Bacillary Dysentery (Flexner). Treatment with Sulfaguanidine and Succinylsulfathiazole.**—*Jl. Amer. Med. Assoc.* 1943. Apr. 24. Vol. 121. No. 17. pp. 1325–1330. With 8 charts. [Refs. in footnotes.]

Succinylsulphathiazole possesses a bacteriostatic action against the intestinal flora and is also effective against Shiga, Sonne and Flexner dysentery.

An opportunity of testing this treatment was provided by an outbreak of bacillary dysentery in an institution comprising 8,000 inmates and 1,800 employees. The evidence which was assembled pointed to the main kitchen as the source of infection. Two carriers of *Bact. flexneri* were discovered in inmates who served food in the patients' kitchen.

Treatment consisted in routine administration of camphorated tincture of opium and bismuth subcarbonate, and wherever indicated, dehydration was controlled by parenteral fluids. One group of 12 patients was given sulphaguanidine ; another group of 24 was given succinylsulphathiazole. In most cases these drugs were started on the first or second day of the disease. The dose of sulphaguanidine was 0·1 gm. per kilo. initially and later 0·3 gm. per kilo. daily, divided into six equal parts. The dosage of succinylsulphathiazole was 0·25 gm. per kilo. initially and 0·25 gm. per kilo. divided into six equal parts and given every four hours. The duration of the sulphonamide therapy varied from 2 to 14 days ; in most it was six days.

On alternate days during treatment complete urine analyses, determinations of haemoglobin, white blood cell counts and sulphonamide blood concentrations were obtained. Although in the majority the level of blood concentration varied from 1 to 5 mgm. per 100 cc., yet in one a figure of 10 mgm. per 100 cc. followed the administration of 81 gm. sulphaguanidine in eight days, in another 16·6 mgm. followed the administration of 27·5 gm. in three days.

Slight vomiting occurred in one case with each drug. No nausea, rash or haematuria was observed, though crystals were found in the urine in 6 out of 10 patients who received sulphaguanidine and in 10 out of 14 who received succinylsulphathiazole. One patient on sulphaguanidine developed drug fever ; the subsequent administration of a test dose of 4 gm. of sulphaguanidine revealed the existence of sensitivity to this drug.

It is evident that both sulphaguanidine and succinylsulphathiazole are of distinct value, but because the latter is equally effective and without the potential toxic effects of the former, it is believed to be the drug of choice in the treatment of Flexner dysentery.

P. Manson-Bahr.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

OTT (Alois). Ueber das Vorkommen von *Entamoeba histolytica* im Duodenum beim Menschen. [*E. histolytica* **in the Human Duodenum.**]—*Deut. Trop. Ztschr.* 1942. Dec. 15. Vol. 46. No. 24. pp. 603–605.

In 13 cases of demonstrated amoebic infection of the large intestine the author has examined the duodenal contents removed by duodenal sound. In six of these cases free *Entamoeba histolytica* or cysts were encountered—usually only isolated examples of the parasite were seen but in one case there was a heavy infection, five to ten amoebae being seen in a single field of the microscope. In one case cysts alone were found. The author discusses the origin of these amoebae and comes to the conclusion that it is not possible to state whether they had ascended from the large intestine or come from the liver. In only one of the six positive cases was there evidence of hepatitis. [See also WESELMANN, this *Bulletin*, 1943, Vol. 40, p. 606.]

C. M. Wenyon.

BRADY (F. J.), JONES (Myrna F.) & NEWTON (W. L.). **Effect of Chlorination of Water on Viability of Cysts of** *Endamoeba histolytica*.—*War Medicine*. Chicago. 1943. Apr. Vol. 3. No. 4. pp. 409–419. [Refs. in footnotes.]

Experiments were carried out to test the action of chlorine on cysts of *Entamoeba histolytica* suspended in natural surface water. The water was contained in army Lyster bags, each of which holds 35 gallons. To chlorinate this quantity of water, 500 mgm. ampoules of calcium hypochlorite are supplied. The ampoule contains 70 per cent. available chlorine. To carry out the tests, measured quantities of cysts were added to the water after the contents of one to fifteen ampoules had been mixed with it. The quantities of cysts gave a concentration of 20 cysts per cc. of chlorinated water. At varying intervals, measured amounts of water were withdrawn and the chlorine neutralized with sodium thiosulphate. The cysts were allowed to sediment, and the cyst-containing deposit was inoculated into ten tubes of culture medium, each tube receiving approximately 2,000 cysts. It had already been shown that a minimum of 20 viable cysts was required to give a culture consistently. With water to which had been added the contents of one ampoule, the cysts withdrawn at intervals up to 150 minutes gave cultures of amoebae in nearly half the tubes inoculated. With water to which 15 ampoules had been added, nearly all the tubes gave cultures with cysts exposed for 15 minutes or less. Of 150 cultures made after 15 minutes' exposure, nine were positive. It would appear that cysts cannot be killed by chlorine in any practicable concentration unless exposure is for 20 minutes or longer.

C. M. Wenyon.

BELTRAN (E.). La balantidiosis en México. [**Balantidial Infection in Mexico.**]—*Gac. Méd. de México.* 1942. June 30. Vol. 72. No. 3. pp. 288–301. With 1 fig. [31 refs.]

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

DAVIS (G. E.) **Tick Vectors and Life Cycles of Ticks.**—Reprinted from *Amer. Ass. Advancement of Science. Publ. No. 18.* pp. 67–76. [49 refs.]

The content of this most useful paper is hardly indicated by its title. It summarizes the known distribution of human relapsing fever and of the 25 species of *Ornithodorus* in the Americas, and gives a brief account of what is known of the life history of these ticks. These are matters on which there has been very rapid progress, largely owing to the work of the author and colleagues at the Rocky Mountain Laboratory.

It would be difficult to give a useful summary of the paper. A point of great interest is that the epidemiology of the disease is much influenced by the biology of the vector species of tick. The author regards *O. talaje* G. M. as specifically distinct from *O. rudis* Dunn (*venezuelensis* Brumpt). *P. A. Buxton.*

COOLEY (R. A.). **Determination of Ornithodoros Species.**—Reprinted from *Amer. Ass. Advancement of Science. Publ. No. 18.* pp. 77–84. [46 refs.]

The author has had a first-hand knowledge of American ticks for many years. He presents a valuable account of the characters to which attention should be paid in identifying Ornithodorus and an annotated list of the species of the world. The paper is a very valuable summary of the subject [though we believe that *Ornithodorus coniceps* has been omitted in error].

It seems that the species feeding on bats are generally confined to that group of hosts. Other Ornithodorus feed on several hosts, and *O. turicata* has been recorded from a number of mammals (man, rodents and ungulates), one bird and several reptiles. Nineteen of the known 45 species are known to bite man. In the Americas, five (*talaje, mutis, hermsi, turicata* and *parkeri*) all transmit spirochaetes of human relapsing fever. *P. A. Buxton.*

DAVIS (G. E.). **Relapsing Fever: the Tick *Ornithodoros turicata* as a Spirochetal Reservoir.**—*Pub. Health Rep.* Wash. 1943. May 28. Vol. 58. No. 22. pp. 839–842.

The author has tested the infectivity of *Ornithodorus turicata* through five generations, and shows that this tick may be a more efficient "spirochaetal reservoir" than the rodent host.

The original stock comprised 86 ticks collected from the sand and from a cottontail rabbit in the burrow of a prairie dog (*Cynomys* sp.) in Clark County, Kansas. A strain of spirochaetes was recovered by feeding the ticks on a white rat. One of the infected nymphs reared to a female served as the origin of the ticks used in this experiment, which extended over six years.

The progeny found to be infective in each of the five generations amounted to 6 ticks (35 per cent.), 55 ticks (96 per cent.), 66 ticks (100 per cent.), 107 ticks (47 per cent.), and 136 ticks (100 per cent.), respectively. *E. Hindle.*

VAKIL (R. J.). **Reporting a New Form of Rat-Bite Fever or *Sodoku* in Bombay (the Gummatoid Form).**—*Indian Med. Gaz.* 1943. Feb. Vol. 78. No. 2. pp. 68–69.

A description of two new cases of rat-bite fever occurring in Bombay and a short summary of two previously reported cases, all showing the rare clinical condition of multiple gummatoid lesions (within muscle and periosteum), associated with the usual manifestations of this disease.

Unfortunately, the causal organism was not isolated from any of these patients, the diagnosis being made entirely on the clinical records of the cases. *E. Hindle.*

LAHIRI (M. N.). **A Study on Leptospirosis in Bombay City.**—*Indian Med. Gaz.* 1943. Feb. Vol. 78. No. 2. pp. 65–67. [10 refs.]

A record of six cases of leptospirosis, recognized in Bombay City during the six months following the author's discovery of the first

proved case of the disease in 1941 [see this *Bulletin*, 1942, Vol. 39, p. 346]. The diagnosis in each case was confirmed bacteriologically and all belonged to the typical *L. icterohaemorrhagiae* group.

The cases occurred in different localities and all were in adult males between 20 and 40 years of age. No occupational incidence was noted, but the premises in which they occurred were all heavily infested with rats, which would seem to be the probable source of the infection. It appears likely that the disease is more common in the city than was previously supposed. *E. Hindle.*

LEPROSY.

INDIA, GOVT. OF: CENTRAL ADVISORY BOARD OF HEALTH. **Report on Leprosy and its Control in India. By the Committee appointed by the Central Advisory Board of Health (1941).**—iv+70. With 2 maps. 1942. New Delhi: Govt. of India Press.

This is a comprehensive report of the progress of leprosy work with recommendations for the future by a committee including such experts as Drs. COCHRANE, LOWE and DHARMENDRA. A brief historical introduction is followed by the main findings of various previous inquiries and international and other conferences. The main factors influencing the problem in India are considered and the agencies at work there are described, together with the present position of anti-leprosy work, with chapters on leprosy out-patient clinics and in-patient institutions. Previous leprosy legislation in India is described, most of which is either inefficient or not enforced even in the cities, which are alone influenced by it, and the requirements for future anti-leprosy work are pointed out. The following are the most important conclusions and recommendations.

It is recognized that the great advances of the last two decades resulted from the improved treatment worked out in Calcutta, but the hopes held out by some that large scale out-patient treatment at numerous clinics might solve the leprosy problem in India have not been fulfilled, although they have greatly helped in facilitating valuable surveys and epidemiological inquiries; but they do not remove the necessity of providing in-patient leprosy colonies under rural conditions for the isolation of the more infective cases. Only one province possesses such a modern institution, which is described, but not named, although the Lady Willingdon Leprosy Colony near Madras is clearly indicated. At least one should be provided in every province, with a good staff to allow teaching and research into problems of epidemiology and treatment. [That is just what was advised by ROGERS at a small conference organized in Calcutta by the Mission to Lepers early in 1920, which is not mentioned in Chapter II on Leprosy Conferences.] Home isolation is also discussed but has not yet proved to be of much value. The now generally recognized necessity of protecting children from infection is also emphasized. It is stated that in 1925 the newly formed Indian Council of the British Empire Leprosy Relief Association "started a research unit at the School of Tropical Medicine, Calcutta." [It was in fact started late in 1920 under Dr. E. MUIR, but after 1925 it was financed and extended by the new association.] It is now suggested that a separate leprosy research institute should be founded near a large rural in-patient institution, since the present

Calcutta leprosy research laboratory has no in-patients for study. It is also suggested that a new Leprosy Act, of a more comprehensive nature, should be passed. *L. Rogers.*

COCHRANE (R. G.). **Leprosy in relation to Public Health, being a Course of Lectures delivered at the Course of Training for Health Officers held at the Lady Willingdon Leprosy Sanatorium Chingleput.** 49 pp. 1941. Madras: Govt. Press. [For official use only.]

The introduction states that the object of this course of lectures is to "arouse such interest, sympathy and enthusiasm that you will join that band of workers determined to contribute their utmost to the elimination of a disease which has baffled man for countless generations." After a short history of the spread of leprosy, its epidemiology and aetiology are briefly discussed. Stress is laid on the frequency of infections during childhood, and it is pointed out that, although in the Madras experience of the lecturer benign lesions of a stationary or improving condition form about half their infections, he is in agreement with the early contention of ROGERS and MUIR that close and prolonged contact with leprosy during childhood is a very important cause of infections. Sex and race incidence and the influence of climate and other factors are discussed on the usual lines. A section on pathology follows, expressed in as simple language as possible. The clinical signs are more fully described and are based on the classification of the Cairo Conference of 1938. Treatment and prognosis are more briefly dealt with as not coming within the scope of Public Health Officers, but a timely warning is given not to depart from the well tried and accepted derivatives of hydnocarpus oil, or to be misled by the extravagant claims of firms interested in special drugs of their own. In the treatment of acute lepra reactions the lecturer advocates intramuscular injection of fouadin. Prognosis is illustrated by a useful table and the seriousness of lepromatous cases in childhood is pointed out.

Rightly, the longest section of this booklet, namely nearly one-third, is devoted to prevention. The necessity for isolation of the most infective cases is insisted on and emphasis is laid on selective segregation of infective cases from contact with healthy members of the community either by compulsory or voluntary measures; the latter are considered to be preferable and alone practicable in such a widely infected and so poor a country as India, with probably 300,000 cases in the Madras Province alone. With this end in view an attempt is being made in Madras to organize village isolation, limited to areas in which surveys show the problem to be serious, and the problem of infected children is being especially studied. The importance of propaganda and training of the medical profession is regarded as essential to success. Enough has been said to bring out the value of this publication to public health officers and it bears the stamp of a keen and experienced worker which will ensure its use far beyond India. *L. Rogers.*

PARDO-CASTELLO (V.) & TIANT (Francisco R.). **Leprosy: The Correlation of its Clinical, Pathologic, Immunologic and Bacteriologic Aspects.**—*Jl. Amer. Med. Assoc.* 1943. Apr. 17. Vol. 121. No. 16. pp. 1264–1268. With 1 fig. [15 refs.]

This paper describes the types included in a comprehensive classification of leprosy cases based on pathology, bacteriology and immunology;

this classification has been widely accepted in South America and was well received by United States authorities in a discussion on this paper. It is summarized in the following table.

The Correlation of the Pathology, Immunology and Bacteriology of Leprosy.

	Pathology		Immunology Lepromin Test	Bacteriology
Leprosy of the skin	Lepromatous		Negative	Numerous bacilli
	Tuberculoid	Miliary	Positive	Rare bacilli
		Sarcoidal	Positive	Rare bacilli
		Lazarine	Positive	Abundant bacilli in necrotic areas; rare in tissues.
	Nonspecific	Erythematous	Pos. or Neg. 50%	Few bacilli
		Pigmented	Pos. or Neg. 50%	Few bacilli
		Achromic	Pos. or Neg. 50%	Few bacilli
Leprosy of the nerves	Lepromatous		Negative	Numerous bacilli
	Tuberculoid	Miliary / Colliquative	Positive	Rare bacilli
	Nonspecific		Pos. or Neg. 50%	Few bacilli
Leprosy of other tissues and organs	Lepromatous		Negative	Numerous bacilli
	Tuberculoid	Miliary / Sarcoidal	Positive	Rare bacilli
	Nonspecific ?		?	?

It is pointed out that a classification based on the clinical manifestations of leprosy fails to include the prognosis, epidemiology, pathology and immunology of cases such as the above table brings out by correlating all those factors. Lesions involving the skin, nerves or other tissues and organs may each be classified as :—lepromatous, with the presence of numerous bacilli and negative lepromin tests ; tuberculoid with only rare bacilli and positive lepromin reactions, indicating great resisting power to the infection ; and simple inflammatory, or non-specific, with few bacilli and about equal proportions of positive and negative lepromin reactions, and with a tendency to develop into either lepromatous or tuberculoid forms. The rare lazarine type is classed as a tuberculoid dermal variety with the development of cutaneous gangrene at the site of bullae ; there are abundant bacilli in the bullae but not in the tissues. The non-specific skin lesions include erythematous, pigmented and achromic lesions with slight enlargement of the peripheral nerves ; the tissues show vascular and simple inflammatory changes only with collections of lymphocytes around the larger blood vessels and small nerves. They are transitional types, which may either progress to the lepromatous, or regress to the tuberculoid state, and the lepromin test enables their prognosis to be foretold. Some of the lesions may progress while others regress to form mixed cases.

The lepra reaction is next discussed; it may be predisposed to by alimentary or alcoholic excess or precipitated by too energetic treatment. It may be followed by rapid improvement or by extensive development of the lesions, depending on the shorter or longer duration of the fever. In the tuberculoid type reactions are prolonged, but are attended by positive lepromin tests and have a good prognosis.

Early, non-specific, simple inflammatory lesions may be difficult to diagnose, but on pricking the skin with a needle through a drop of a 1 in 1,000 solution of histamine the occurrence of an erythematous halo around the rapidly forming weal indicates that the nerve endings are intact and the case is not one of early leprosy. Regarding the lepromin test the authors are in agreement with other workers in using emulsions of sterilized lepromata. *L. Rogers.*

FITE (George L.). **Leprosy from the Histologic Point of View.**—*Arch. Pathology.* 1943. Apr. Vol. 35. No. 4. pp. 611–644. [Bibliography.]

This is itself a very comprehensive review of the histological lesions of leprosy described from the time of DANIELSSEN and BOECK in 1847; it contains a very comprehensive bibliography which will be most useful to research workers for reference. The following are the author's most important conclusions: He agrees with Wade's classification of tuberculoid lesions into major and minor, noting that there are rather more bacilli in the former, and he considers that transitions from one to the other must not be altogether rare. The giant cells rarely show the crescentic arrangement of the nuclei seen in lesions due to the tubercle bacillus, and caseation is usually absent. Tuberculoid leprosy represents the natural development to its highest point of immunity to the disease. If, as was suggested by UNNA, the infection is conveyed by the lymphatic channels it soon spreads beyond them, and demonstration in the lymphatics themselves is usually impossible. The reactions of leprosy are a form of allergy, with a hyperergic inflammation which makes old lesions become apparent as new ones.

The remainder of the paper describes in detail the changes in the skin, nerves, respiratory tract and the internal organs, for which the original should be consulted. *L. Rogers.*

GONZALEZ GUZMAN (I.). Estudio de los linfocitos sanguíneos de los leprosos. [**Lymphocytes in the Blood of Lepers.**]—*Arch. Latino Americanos de Cardiol. y Hematol.* 1943. Jan.–Feb. Vol. 13. No. 1. pp. 1–24. With 3 figs. [15 refs.]

A study of the lymphocytes in cases of leprosy has shown that: (i) The number per cmm. is generally within normal limits, but often at the higher extreme or even a little over, but (ii) since the total leucocytes are often a little below normal the actual percentage of lymphocytes is above normal. (iii) A reduction, total or proportional, of lymphocytes coincided with extensive and severe lesions and so is more characteristic of periods of exacerbation of the disease. (iv) *Per contra*, increase is associated with mild cases, or those progressing slowly or remaining stationary. (v) The lymphocyte nuclear picture shows a deviation to the right. (vi) An important modification of the picture is increase of lymphocytes without a nucleolus and of polynuclear forms of Classes IV and V.

The author has considered these several questions on the basis of 36 cases. Taking the normal limits as 1,500 and 2,500 per cmm., he found definite lymphopenia in two, subnormal totals in five, normal values in 24 and lymphocytosis in the remaining five. As regards the nuclear picture he found an increase in Classes II and III at the expense of Class I, as compared with the normal. Other studies included the azurophil granules of Michaelis, the nucleolar picture, the total, the nuclear and the nucleolar volumes, the significance of cells which have lost their nucleoli and the characteristics of those with two nucleoli. He finds an increase in granular forms and that there is a notable increase in cells passed into the circulation devoid of nucleoli; others show hypertrophy of the nucleolar bodies interpreted as the result of hypersecretion of lipoclastic diastase.

In a final table the author gives the relation between the clinical form of the disease, the numbers of leucocytes and the numbers and proportions of the lymphocytes, as found in 27 cases. These are :—

No. of Cases	Clinical forms	Leuco-cytes per cmm.	Lympho-cytes per cmm.	Percentage
9	Diffuse cutaneous	6,211	1,696	27·3
6	Tuberculoid ...	6,683	1,538	23·0
7	Nodular	7,542	2,059	27·3
5	Lucio form* ...	5,140	1,310	23·4

*This is a term used by Mexican dermatologists to denote an acute and severe type of disease.

[The figures of percentages in the last column of the above table are given by the author as 28·4, 23·3, 32·4 and 25·9 respectively, a wrong calculation in each case. In the face of such errors we must take a guarded view of other figures presented in the text where they cannot be so easily verified or corrected. A fairly full abstract has been given because the subject is interesting and calls for deeper study on a much larger number of cases before any generalizations can be drawn. To base so much on so few as 36 cases is, to say the least, unscientific and unsafe.] *H. Harold Scott.*

FIDANZA (E. P.). Consideraciones sobre la roseola leprosa. [**On Roseola in Leprosy.**]—*Medicina.* Bogota. 1943. Feb. Vol. 5. No. 50. pp. 60–63.

[Two important aphorisms are illustrated in this brief but instructive record: First, that we learn much from our mistakes; second, that more mistakes are made from want of examination than from want of knowledge.]

The author relates two cases in which roseolar blotchy rashes occurred on the trunk, slightly raised, painless and appearing fairly rapidly, almost suddenly. In both, a history of promiscuous sexual intercourse was admitted, and one man had a residual lesion behind the glans penis. The former was diagnosed as syphilitic and treatment appropriate for this was given, but nearly six weeks later the lesions were even more marked. The author was led to revise his diagnosis, and examination of the nasal mucus revealed numerous lepra bacilli. The

man left for Europe soon afterwards and died, and 10 years later his widow developed the disease. The second patient gave a very similar history and the distribution of the rash was the same. In view of this, and recalling the former patient, the author made a provisional diagnosis of leprosy, and his colleagues at the hospital confirmed this with their opinions but, having been caught out before, he made a more thorough examination and found signs of an old lesion and indolent enlarged inguinal glands. Smears of the skin lesions revealed *Spirochaeta pallida* and antisyphilitic treatment was soon followed by clearing of the rash. *H. Harold Scott.*

MONTEL (R.). Suite de quelques observations de lépreux publiées en 1932 et en 1936. Guérison ? [**Further Observations on Cases recorded in 1932 and 1936. Cure ?**]—*Bull. Soc. Path. Exot.* 1942. Jan. 14 & Feb. 11. Vol. 35. Nos. 1–2. pp. 39–41. [13 refs.]

The author reports on cases followed up for years after treatment. The first was a patient with tuberculoid and tropho-neural disease, under observation since 1915, who remains in excellent health 18 years after cessation of treatment. The second was diagnosed in 1922 as having tropho-neural lesions which cleared up by 1931 ; she remains well two years after cessation of treatment, together with her four children. Similarly the third, with tuberculoid and tropho-neural disease remains well two years after cessation of treatment and nine years after coming under observation. In all three the symptoms were progressive when first seen ; although they were of favourable types, so their recovery is attributed to their treatment by collobiase of chaulmoogra [a turpentine preparation in colloidal form for intravenous or intramuscular injection]. A fourth case of generalized tubercular leprosy was lost sight of when the disease was running its usual course with nerve and eye complications. [See also this *Bulletin*, 1932, Vol. 29, p. 848 ; 1937, Vol. 34, p. 31 .] *L. Rogers.*

DUBOIS (A.) & VALCKE (G.). Résultat du traitement d'un cas de lèpre lépromateuse (nodulaire) chez l'Européen. [**Results of Treatment of Nodular Leprosy in Europeans.**]—*Ann. Soc. Belge de Méd. Trop.* 1942. Dec. 31. Vol. 22. No. 4. pp. 319–323.

KRAKOWER (Cecil), MORALES-OTERO (Pablo) & AXTMAYER (Joseph H.). **The Effect of Sulfanilamide on Experimental Leprosy.**—*Jl. Infect. Dis.* 1943. Jan.–Feb. Vol. 72. No. 1. pp. 1–10. With 3 figs.

This paper describes carefully controlled experiments on rats and mice, injected with either living or dead emulsions of a virulent mouse strain of lepra bacilli, to determine the effect of simultaneously feeding the animals on a diet which included 1 per cent. of sulphanilamide, and on one occasion of sulphathiazole. Sixty-three young albino rats were used in the first experiment. In animals treated with the former drug, during the whole of the experimental period of one year only very small lepromata developed, and the regional lymph glands became very mildly leprous without any other distant metastases ; as opposed to large lepromatous masses, local ulceration and extensive metastases in the glands and internal organs in the control, untreated, animals. Intermediate lesions occurred in animals in which the treatment was

left off after the first five to seven months. In animals treated only during the last seven months of the experimental period, when the infection had already obtained a good hold, the lesions were greater than in those treated only during the first five months, but less than in untreated animals.

Tests of the viability of the lepra bacilli after the full development of the lesions had been inhibited by a year's treatment showed that they had retained their virulence unimpaired, and the bacilli had not been rendered sulphanilamide-fast. Histologically the lesions in the treated animals showed no important differences except that there were fewer bacilli and giant cells and no fibrous encapsulation; these lesions therefore resembled those caused by heat-killed bacilli. Experiments with albino mice showed very similar results. The single trial of sulphathiazole produced effects similar to those of the other drug. With neither was there any evidence of the lepra bacilli being killed, but only retardation of their effects during the continuance of the drug.

L. Rogers.

HELMINTHIASIS.

DRENOWSKY (A. Kirilow). Helminthologische Untersuchungen im Distrikt Petritsch (Südbulgarien). [**Worm Survey in Petritsch, Bulgaria.**]—*Deut. Trop. Ztschr.* 1943. Feb. 15. Vol. 47. No. 4. pp. 94–96.

The author examined 1,108 stools of children by the Willis floatation technique; worm eggs were found as follows:—

Ascaris lumbricoides in 36·28 per cent.; *Trichuris trichiura* in 7·94 per cent.; *Hymenolepis nana* in 5·05 per cent.; *Enterobius vermicularis* in 1·18 per cent.

Clinical symptoms were only produced in the more delicate children, or in those whose bowels did not act regularly. *C. W.*

SCHILL (Emerich). Pharmakologische Untersuchungen an Askariden. [**Pharmacological Researches on Ascarids.**]—*Deut. Trop. Ztschr.* 1943. Mar. 1. Vol. 47. No. 5. pp. 105–122.

The author worked in the Budapest slaughterhouse, using Ascarids taken freshly from pigs. He first studied the normal movements of the worms, because changes in these are our only means of judging the action of anthelmintics *in vitro*.

For the study of the action of anthelmintics the Ascarids were put in solutions of these in vessels kept in a water bath at body temperature, with controls in water, their movements being observed at frequent intervals. When movement was abolished by a drug, attempts were made to restore it with external stimuli and some worms were washed twice and kept under observation to see whether movements returned. It must be remembered that Ascaris may be motionless at

times in the intestine. Worms were also studied in intestinal contents with and without anthelmintics, because the intestinal contents affect anthelmintics chemically and physically. The doses are those used in 100 cc. of water.

Early experiments showed that known anthelmintics were active on the worms, but only so in water; in intestinal contents they were either not active or were so only after a long time. The anthelmintics tried were santonin, oil of chenopodium, ascaridol, hexylresorcinol and caprokol. The two latter were hardly obtainable and in 0·03 gm. santonin movement ceased in a few minutes, but returned without washing the worms after 15–20 minutes, so that its action was only transitory. Most of the experiments therefore were done with oil of chenopodium. Strychnine and picrotoxin increased the activity for an hour. Sodium phenyl ethyl barbiturate (0·3 gm.) was quite inactive. Sodium bromide (1 gm.) increased the activity, especially when given with 0·01 gm. strychnine. Chloral hydrate (0·5–1·5 gm.) was inactive within 1¼ hours. Urethane (1–3·3 gm.) acted only after ¾ to 1 hour, amylene hydrate (1 per cent.) after half an hour. Paraldehyde (1–1·5 gm.) acted in 10–13 minutes, causing complete loss of movement, but movements returned after 20 minutes; after 1½ hours the worms were motionless again. Chloroform used as Aqua chloroformi was active in water, 15 gm. being always so, 7·5 gm. not always so; but in intestinal contents both these doses were inactive or active only after a long time. Only doses of 30 gm. act quickly and with certainty. Ten cc. of alcohol acted quickly and with certainty, 5 cc. more slowly; but both these doses acted within the same time in both water and intestinal contents. The addition of 15 gm. of aqua chloroformi to 5 cc. of alcohol markedly quickened its action. The simultaneous administration of 0·5 gm. paraldehyde, 15 gm. aqua chloroformi and 5 cc. alcohol quickened the individual action of these substances both in water and in intestinal contents. Possibly the action is quicker because the alcohol brings the paraldehyde into solution. The action of oil of chenopodium is delayed in intestinal contents, but the addition to it of alcohol and chloroform or paraldehyde increases its activity both in water and in intestinal contents. These four substances together give the best results.

The inactivity of anthelmintics may be due to the inactivation of the anthelmintic by the intestinal contents, to the protection afforded by the mucus which surrounds worms taken fresh from the intestine and to the fact that capsules in which anthelmintics are often given do not open until they have passed below the region inhabited by the worms. The author found that enteric or alkali solvent capsules remained undissolved for an hour at body temperature in a solution of 0·5 per cent. trypsin made alkaline with 0·2 per cent. sodium carbonate. He suggests the following procedure to overcome these difficulties. A duodenal sound is passed under Roentgen-ray control, the intestine is emptied and the mucus in it dissolved by washing out with sodium bicarbonate solution; after a quarter of an hour 100 cc. of water containing 0·06 gm. oil of chenopodium, 0·5 gm. paraldehyde, 15 gm. aqua chloroformi and 5 cc. absolute alcohol are passed through (0·03 gm. santonin can also be added). This is repeated after half an hour to attack resistant worms and worms unaffected because their mouths were applied to the mucosa while the first dose was being given. After another quarter of an hour a saline purge is administered.

G. Lapage.

RAČIĆ (Jakša). Massenhafter Spulwurmbefall im Röntgenbild nachgewiesen. [**Massive Infestation with Ascaris demonstrated by Röntgen Ray Photograph.**]—*Der Chirurg.* 1943. Feb. 1. Vol. 15. No. 3. pp. 77–79. With 1 fig.

The patient was a girl aged 8 years. For 3 days she had had intermittent abdominal pain, vomiting, obstinate constipation and flatulence. During these attacks a knotlike swelling could be made out, which tended to disappear with audible splashing as the pain diminished, only to reappear again with repetitions of the attacks. Beneath the navel elongate, resistant structures were palpable, which moved under light massage and kneading, often with the production of spasm of the intestine and pain; this spasm disappeared with "cooing" and splashing sounds.

Ascariasis is very common in Dalmatia and Račić's wide experience of it suggested that the case was not urgent. It was treated with the usual doses of santonin and calomel. These drugs were sometimes vomited and sometimes retained. The patient's condition improved with the passage of much wind and large stools in which numerous Ascaris were found. The radiogram figured was taken six hours after a barium meal. It shows clearly the worms arranged parallel to one another in bundles; this condition is not so dangerous as when they are tangled into a ball, which may cause intestinal obstruction. Other cases illustrating this latter condition are briefly described. The arrangement of the worms in parallel bundles in the case here described did not cause complete intestinal obstruction, although extensive coils of the intestine were involved. Subsequent doses of santonin removed 373 ascarids, all of which were adults. It was remarkable that repeated examinations of the stools failed to reveal any eggs of Ascaris, but males were preponderant in the worms passed, in the proportion of four males to one female. Further radiograms failed to show that any of the barium meal had been ingested by the ascarids.

G. Lapage.

WATT (John Y. C.). **Active Immunization of Rats against** *Nippostrongylus muris.*—*Proc. Soc. Experim. Biol. & Med.* 1943. Feb. Vol. 52. No. 2. pp. 67–72. With 2 figs. & 1 chart.

Using filtered aqueous extracts of dried adult *Nippostrongylus muris* and of larvae of the same species, the author produced immunity against infestations with this species of nematode by subcutaneous injection of the filtrate. The strain of *N. muris* used had been obtained in 1939 from a wild Norway rat. Its infective larvae were washed repeatedly in tap water in a centrifuge and an estimated number of them were spread on the shaved abdomen of a rat lightly anaesthetized with ether and were left on this for 30 minutes. The infestation so produced was estimated by egg counts of the faeces of the rats and by killing the rats and counting the worms in the small intestine and the larvae in the lungs. Antigens were made by repeatedly washing in distilled water adult worms or larvae taken from infested rats; these were then dried in a desiccator for three to four days, the resulting mass was powdered and mixed with 0·85 per cent. salt solution, usually in the proportion of 1 in 50. In this suspension extraction proceeded for 24 hours at room temperature followed by five to six days in the refrigerator. The suspension was then shaken for one hour and put

through a Seitz filter, the filtrate having a *p*H of 7·2 to 7·3. This stock antigen was kept in the refrigerator. To produce immunity 2 cc. of the antigen per 100 gm. rat weight were given subcutaneously in a dilution of 1 in 200, followed by 1,200 larvae placed on the shaved abdominal skin. In the first experiment it was found that, 12 days after infestation, both the rats given the adult antigen and those given the larval antigen had considerably fewer adult worms, especially those given the antigen 20 days before infestation, than the controls. In the second experiment the rats given the larval and adult antigens all produced fewer eggs, especially between the 10th to the 13th days after infestation; on the 27th day after infestation, when all the egg counts were low, there were more larvae in the lungs of the immunized rats, fewer females than males in the intestines of the immunized rats, and also more immature males and females in some of them.

The author concludes that immunity can be produced to a marked degree by injection of antigens prepared by extraction of adult and larval *N. muris*, that the immunity is effective against both the larvae in the lungs and against the intestinal phases of the worm and possibly also against its larvae in the skin. Immunization by antigens of the types used precludes any possibility of premunition.

G. Lapage.

WATT (J. Y. C.), GOLDEN (Walter R. C.), OLASON (Fridgeir) & MLADINICH (George). **The Relationship of Vitamin A to Resistance to** *Nippostrongylus muris*.—*Science*. 1943. Apr. 23. Vol. 97. No. 2521. pp. 381–382.

"The above results indicate that the lack of vitamin A in the diet of the experimental animals lowers their resistance to primary infection, as well as subsequent reinfection, with *Nippostrongylus muris*. Furthermore, plasma derived from animals with low vitamin A levels affords no protection against this parasite in the way of positive transfer of immunity. In contrast, the rats fed on the same diet, plus vitamin A supplement, developed a marked resistance to infection with this nematode, such as has been described by Schwartz *et al.*, in addition to protection rendered normal rats by plasma from 'hyperimmunized' rats, as previously demonstrated by one of us."

RILEY (E. G.). **The Effect of Various Stages of Vitamin A Deficiency in the White Rat on the Resistance to** *Nippostrongylus muris*.—*Jl. Infect. Dis.* 1943. Mar.–Apr. Vol. 72. No. 2. pp. 133–141. With 1 fig. [22 refs.]

"A decrease in resistance to infection of A-avitaminotic white rats with *Nippostrongylus muris* found by Spindler is confirmed.

"The decrease in resistance does not become evident until the rats have been upon the deficient diet for 4 weeks. After 2 weeks of vitamin A depletion, there is actually an increase in resistance to infection.

"The changed resistance manifests itself by a more intense and prolonged infection.

"Immune serum is relatively as effective in decreasing the peak of infection in both normal and deficient rats, although in the latter, many of the worms may merely be slowed in their migration through the body of the host."

LEVIN (M. B.). **Infestation with** *Strongyloides stercoralis.*—*Jl. Lab. & Clin. Med.* 1943. Mar. Vol. 28. No. 6. pp. 680–682. With 4 figs.

"A case is reported in which (1) infestation of *Strongyloides stercoralis* parasites was contracted in a relatively northern region; and (2) the rarely observed male larval and adult form of the *Strongyloides stercoralis* was found in the stool."

CULBERTSON (James T.). **Natural Transmission of Immunity against** *Trichinella spiralis* **from Mother Rats to their Offspring.**—*Jl. Parasitology.* 1943. Apr. Vol. 29. No. 2. pp. 114–116. [10 refs.]

"The transmission of immunity against *Trichinella spiralis* from mother rats to their young takes place in the same manner as does that against trypanosomes—that is, largely or entirely by the ingestion of the milk of the immune mother. Little or no transmission occurs while the young are in the rat uterus, by way of the placenta. Although these conclusions seem established, from the data offered, in the case of rat trichiniasis, it is, however, not necessarily true that the same route of transfer operates in the human infection with the same parasite. Most authorities feel, indeed, that in most human infections, acquired immunity is transmitted from mother to young by way of the placenta and not through the milk.

"The immunity acquired by rats after infection with *Trichinella spiralis* is transmitted to their young, the transfer occurring largely, if not entirely, through the milk of the immune mother. The young born of normal mother rats promptly become immune if permitted to nurse an immune mother rat. Conversely, the young of an immune mother are as susceptible as the young of a normal mother if they are transferred at birth to a normal mother."

FISCHTHAL (Jacob H.). **Number of Larvae and Time required to produce Active Immunity in Rats against** *Trichinella spiralis.*—*Jl. Parasitology.* 1943. Apr. Vol. 29. No. 2. pp. 123–126. [14 refs.]

"It appears evident from the low numbers of adult *Trichinella spiralis* recovered from the intestines and the low numbers of larvae recovered from the muscles of rats that a single small dose of larvae is capable of producing immunity and that a period of approximately 14 days is adequate to develop this immunity. The feeding of 80 larvae produces a fairly high degree of immunity in 14 days; the 160 dose produces, in the same length of time, a higher degree of immunity; while both the 320 and 640 doses of larvae apparently produce complete immunity in a period of 14 days. The immunity produced is effective against the intestinal phase of the parasite. Little or no immunity is produced within seven days after feeding 80 to 640 larvae."

WESTPHAL (Robert S.). **Human Trichinosis following Ingestion of Bear Meat.**—*Jl. Amer. Med. Assoc.* 1943. May 22. Vol. 122. No. 4. pp. 227–228.

[See *Bulletin of Hygiene*, 1931, Vol. 6, p. 61; 1932, Vol. 7, p. 575.]

OFFICER-BROWN (C. J.). **Hydatid Disease of the Lung.**—*Rov. Melbourne Hosp. Clin. Rep.* 1942. Dec. Vol. 13. pp. 66–71. With 12 figs. (11 on 3 plates).

DEFICIENCY DISEASES.

FOLLIS (Richard H.), Jr., MILLER (Mitchell H.), WINTROBE (Maxwell M.) & STEIN (Harold J.). **Development of Myocardial Necrosis and Absence of Nerve Degeneration in Thiamine Deficiency in Pigs.**—*Amer. Jl. Path.* 1943. Mar. Vol. 19. No. 2. pp. 341–357. With 2 text figs. & 4 figs. on 1 plate. [23 refs.]

It is always wise to be guarded in applying the results of animal experiments to seemingly analogous conditions in human subjects. The authors have carried out some very instructive experimental work on pigs and have with due caution drawn attention to its possible application to beriberi in man.

Thiamin has been found to alleviate cardiac embarrassment most dramatically in certain cases and the authors have aimed at determining what connexion might exist between the beriberi heart and thiamin deficiency. They used pigs as experimental animals. One group received (per kgm. per day) 0·12 mgm. riboflavin, 1·2 mgm. nicotinic acid, 0·2 mgm. pyridoxin hydrochloride, 10·0 mgm. cholin chloride and 0·5 mgm. calcium pantothenate; no thiamin. A second group received the same plus 10 μgm. thiamin hydrochloride, *i.e.* a "low thiamin" group. A third group had desiccated whole liver containing about 40 μgm. thiamin, or less, but rich in the other components of the B group. On death of the animals, whether natural or not, complete autopsies were performed and particular attention was paid to heart, lungs, brachial, sciatic and vagus nerves, the motor and sensory nerve-roots, dorsal root ganglia and spinal cord. A cardiac lesion constantly found was dilatation, the mode of death being that of heart failure with laboured breathing and cyanosis; others died unexpectedly and unobserved at night. Focal and diffuse myocardial necrosis was found in those dying with thiamin deficiency. None of the controls receiving thiamin presented any myocardial changes.

In comparing these with what is known of beriberi in man the authors deplore that so few microscopical studies of the heart have been made. The changes mentioned under the terms Fiedler's myocarditis, or isolated myocarditis of unknown aetiology, closely simulated those found in the experimental pigs. The older ideas that "beriberi heart" was due to vagus degeneration or respiratory paralysis have been discarded and the "water retention" of WENCKEBACH or hydropic degeneration is not limited to beriberi hearts, but is found in cardiac failure from various causes. An important fact is noted, namely that a metabolic disorder of the myocardium may precede any anatomical changes and death may take place before the development of recognizable cardiac lesions.

H. Harold Scott.

EGIDIO (C.). Il quadro emoproteico nella pseudotabe tropicale. [**The Blood-Protein in Tropical Pseudo-tabes.**]—*Boll. d. Soc. Italiana di Med. e Igiene Trop.* (Sez. Eritrea.) Asmara. 1943. Vol. 2. No. 2. pp. 29–33. English summary (6 lines).

Hypoproteinaemia with increase of globulin and inversion of the protein quotient has been noted in beriberi and the oedema of this disease has been ascribed to this deviation. Pseudotabes is a syndrome associated with vitamin B deficiency, or altered metabolism of it, so the author has estimated the total nitrogen, serum nitrogen and the residual nitrogen in eight healthy subjects, four Europeans and four natives, in eight persons suffering from other diseases such as advanced tuberculosis, beriberi, hepatic cirrhosis and chronic nephritis, and in twelve patients in mild and severe grades of pseudotabes. The work was done in Eritrea and the results are given in tables.

The author found that the normal blood-protein, whether of Europeans in the country or of natives, did not differ from the figures recorded in other races and in countries other than Eritrea. Also that in oedematous states the changes were the same as those recorded elsewhere, that some forms of pseudotabes have a blood-protein picture similar to that of beriberi. The modifications seen in pseudotabes are: (1) The total protein nitrogen was below normal in four of the twelve, but ranged within normal limits in the rest. (2) The serum nitrogen was below normal in four, the globulin nitrogen was distinctly increased in three, lessened in six, the residual nitrogen increased in ten, and, finally, the protein quotient was below 1·5 in four cases, considerably raised in six. All these, it is maintained, lead to, or confirm, the conclusion that tropical pseudotabes is due to or associated with vitamin B deficiency. *H. Harold Scott.*

HARDWICK (S. W.). **Pellagra in Psychiatric Practice. Twelve Recent Cases.**—*Lancet.* 1943. July 10. pp. 43–45. [12 refs.]

An account of the "main clinical findings in ten recent cases of pellagra encountered among chronic psychotic patients" [presumably at West Park Hospital], aged 35 to 60 years [sex not mentioned] together with notes on two cases in women aged 37 and 63 years respectively admitted to an observation ward for mental disorders [presumably at St. Pancras Hospital]. The diagnosis was made on the characteristic dermatitis. Of the ten patients seven were chronic schizophrenics, one had paraphrenia, one dementia, one imbecility. Loss of weight was marked, marginal glossitis was noted but stomatitis not observed. One patient developed angular stomatitis as the rash faded [the condition of the lips is not mentioned].

Diarrhoea occurred in all except three, but Flexner dysentery is endemic in the hospital. Seven exhibited ataxia and three tremulousness; five showed signs consistent with peripheral neuritis. In two vaginitis was present with ulceration about the vulva and perineum. "Probably a combination of factors operated in the production of the disease"—faulty eating habits and dietary, or dysenteric infection.

H. S. Stannus.

SUZMAN (M. M.). **Clinical Aspects of Vitamin B Deficiency in South Africa.**—*Clin. Proc.* Cape Town. 1942. July. Vol. 1. No. 7. pp. 205–231. With 3 graphs & 20 figs. on 12 plates. [11 refs.]

A good general account.

DERMATOLOGY AND FUNGOUS DISEASES.

VAN STUDDIFORD (M. T.). **Intestinal Parasites and Skin Diseases.**—*Southern Med. Jl.* 1943. Mar. Vol. 36. No. 3. pp. 238–240.

The author draws attention to his experience that, in certain cases of skin disease in which no focus of bacterial toxin production can be found, the eradication of a hookworm or amoebic infection, if such be present, will often be followed by cure. He notes that when *Entamoeba coli* alone has been found it is safe to assume that *E. histolytica* also is present in most cases, and would be demonstrated if repeated examination were made. To avoid delay, therefore, antiamoebic treatment is instituted on the evidence of the *E. coli* infection.

C. M. Wenyon.

VIEIRA (G.) A proposito do pityriasis versicolor. [**On** *Pityriasis versicolor.*]—*Folha Med.* 1943. Mar. 5. Vol. 24. No. 5. pp. 45–46.

Cases of pityriasis versicolor are said to be common in Brazil, where the disease goes by the local names of *Pano branco* (white cloth or white film) and *Titinga*. The author discusses the origin of the name Titinga without coming to any definite conclusion, quoting an old Brazilian dictionary which says that it means "something white." Professor GOUGEROT classifies the condition under two main categories: (1) Achromial, of which he gives ten varieties, due to exposure to ultra-violet sun-rays and appearing white or red on a more or less burnished skin. (2) More rarely seen, nummular or circinate, erythematous or erythemato-squamous patches on white unpigmented skin; of this he gives six varieties. By the Wood light *Pityriasis versicolor* appears as a light salmon-pink or bright sulphur-yellow, unmistakable for any other skin condition (according to Gougerot). The patients themselves often fear that they are victims of syphilis or leprosy and cases of vitiligo have been mistaken for it. The author mentions half a score of "remedies", some containing iodine, others tannic acid, mercury, chrysophanic acid, pyrogallic acid, 20 per cent. nitrobenzene, indicating the want of response to any one application.

H. Harold Scott.

NOOJIN (R. O.) & CALLAWAY (J. L.). **Action of Sulfonamide Compounds on Blastomyces Dermatitidis in Vitro.**—*Arch. Dermat. & Syph.* 1943. May. Vol. 47. No. 5. pp. 620–626. With 4 figs.

"In vitro experiments were carried out with sulfanilamide, sulfapyridine, sodium sulfapyridine, sulfathiazole, sodium sulfathiazole, sulfadiazine and sulfaguanidine to determine their effect on the growth of Blastomyces dermatitidis. . . . None of the drugs were effective at levels as high as 10 mg. per hundred cubic centimetres, which is as high a blood level as is easily and safely maintained for any considerable time." With higher concentrations sulphadiazine proved to be more effective than sulphanilamide and both were more effective than were the other drugs. Fungistatic concentrations were not obtained until high concentrations were reached. Sulphadiazine, for instance, was not decidedly fungistatic until a concentration of 125 mgm. per 100 cc. was used. These experiments therefore suggest that

the compounds would be ineffective if used orally or parenterally in treatment of blastomycosis. As a wet dressing or powder applied locally on cutaneous lesions sulphadiazine, sulphanilamide, sulphapyridine and sodium sulphapyridine might be effective therapeutically as the local concentration would be considerably higher than that which can be maintained in the blood. *Sydney Thomson.*

BRODERS (A. C.), DOCHAT (G. R.), HERRELL (W. E.) & VAUGHN (L. D.). **Histoplasmosis producing Vegetative Endocarditis. Review of Literature, with Report of a Case.** *Jl. Amer. Med. Assoc.* 1943. June 19. Vol. 122. No. 8. pp. 489–492. With 4 figs. [Refs. in footnotes.]

The only morbid signs or symptoms in this case of histoplasmosis, in an American male white aged 47, were irregular fever of four months' duration and a soft systolic heart murmur suggestive of endocarditis. There was an earlier history of peritonsillar abscess and an abdominal disturbance suspected to be cholecystitis. Exhaustive physical examinations at the Mayo Clinic revealed nothing abnormal except the apparent endocarditis. A tentative diagnosis of subacute bacterial endocarditis was not confirmed by blood culture and, in view of the history of earlier hepatic disturbance, an exploratory laparotomy was done. Exploration of the liver for evidence of entamoebic abscess gave a negative result and, before completing the operation, a small piece of the liver was removed for microscopic examination. The liver sections showed the characteristic picture of histoplasmosis and the parasite was identified *in situ*. Treatment with tartar emetic was without effect and the patient died 11 weeks after the operation.

At the autopsy the heart showed old-standing rheumatic endocarditis with superadded Histoplasma infection, affecting both mitral and aortic valves, and *Histoplasma capsulatum* was identified *in situ*. A few yeasts of the parasite were found in the spleen but, despite lesions suggestive of histoplasmosis, and the ante-mortem findings in the liver sections, the parasite was not found in the liver, kidneys or any other organ.

[Presumably the diagnosis of histoplasmosis was not confirmed by culture of the fungus.]

The interesting features of this case are the paucity of signs or symptoms, despite the extent of the infection, pointing to histoplasmosis in any clinical form, and the extraordinary way in which the diagnosis was made. Failure to find identifiable parasites *post mortem* where they had been numerous *ante mortem* is not an uncommon experience in histoplasmosis.

This report gains additional interest from the fact that two cases of histoplasmosis, one not yet published, have been identified in England.

J. T. Duncan.

MISCELLANEOUS.

THOMAS (R. H.). **Small Sanitary Structures : the Need for Care in Design.**—*Jl. Roy. San. Inst.* 1943. July. Vol. 63. No. 3. pp. 132–140. With 8 figs.

The author of this article is an Inspector in the Department of Health, Northern Rhodesia ; the " Small Sanitary Structures " dealt with are " French drains," soakaways, grease-traps, and bucket and pit latrines.

The populations concerned are those of four main towns on the Northern Rhodesia Railway strip, the average white population being 1,000, with 6,000 Africans, and a minority of Indians. The country is only now beginning to emerge from its pioneer days. The author outlines measures which he has adopted to overcome some of the problems met with, and to break down the prejudices of the (indigenous) population.

In general, the method adopted for the disposal of waste water from households, hotels, and laundries, is by soakaways (also referred to as septic tanks) fed by " French drains," and the construction of these is described. With such a system the author experienced the inevitable trouble due to grease, etc., rendering the soakaways water-tight, and much of the article is devoted to the design and construction of grease-traps intended to prevent this trouble. The grease-traps described and illustrated consist of three chambers, the centre chamber being only slightly larger than those at the ends. The first, or inlet, chamber is shown filled to water level with clinker, the second and third chambers are baffled in varying ways. A charge of lime—approximately two pounds per month—is placed in the centre chamber. It is claimed that the effluent " is clear and appears free from suspended matter or grease." [However this may be, these grease-traps embody many undesirable features ; *e.g.*, the clinker in the first chamber which " should be cleaned out weekly " can serve no useful purpose, and it must greatly complicate the cleansing process ; the arrangement of the chambers and baffles could be both simplified and improved.] Two traps (of 56 and 73 gallons capacity respectively) are shown, each embodying similar principles though differing slightly in construction.

The statement is made that " The author's grease-trap sizes agree very closely with those tabulated by Major Clay in ' Camp Sanitation ' though the design appears to be rather different from that which he has in mind." Ref. *Jl. Roy. San. Inst.*, 1942, Vol. 62, p. 62. [In fact, similarity is confined to the effective capacities—not the " sizes "—dealt with ; in other respects these grease-traps are totally different from those described in the article to which the author refers.]

The soakaways described and illustrated are honey-comb brick-lined at the sides, the floors being covered with a deep layer of stones, the purpose of which is to prevent soil erosion. The brickwork is 18-inch solid work for the lowest six or seven courses, reduced above to 14- and 9-inch work. Concrete covers with access doors are provided. The capacities are equal to approximately one and a quarter times one day's estimated flow of waste water, which is in accordance with general practice.

[It is difficult to see the advantage of this expensive form of construction for soakaways, since in the event of their becoming water-tight no amount of cleansing of the interior could greatly improve the absorptivity of the surrounding earth.]

Dealing with European and Native conservancy, the author describes and illustrates several forms of bucket latrines as he found them, and gives details of designs evolved and used to replace them.

Outside town areas, pit latrines are commonly used. The pits are made 2 feet 6 inches in diameter and from 15 to 30 feet in depth. The method of excavation is not stated; they resemble the bored-hole latrine, but they could not be bored by hand to so large a diameter. Latrine risers and seats with covers are provided on concrete floors over the pits. Immediately below the floor in each case, a branch pipe is taken from the pit and, rising sharply, terminates in a fly-trap situated in daylight outside the latrine enclosure. The value of this device is evidenced by the rapidity with which the traps become "filled with flies." [This is in accordance with experience of Field Hygiene Sections operating in other parts of Africa during the present war.]

Care in the siting of pit latrines, both from the point of view of possible excessive rise of the water-table [a matter which is liable to be overlooked] and from that of the pollution of water supplies, is stressed. *Henry H. Clay.*

MACPHERSON (I.) & CLARK (J. M. P.). **External Popliteal Paralysis in Malta.**—*Med. Press & Circular.* 1943. July 7. pp. 15–16.

The authors give an account of a peculiar condition of which they have observed ten cases within a year at Malta. All were among combatants, seven from the army, two from the navy, and one a German prisoner. None was seen among the Maltese troops and none was heard of among the civilian population. The symptoms were: numbness over the dorsum of one foot and outer side of the leg, with little or no pain, soon followed by "flapping" of the foot [presumably foot-drop] and weakness of movements at the ankle joint. The onset might be sudden or gradual, but there was no systemic disturbance. Most of the patients showed tactile anaesthesia and analgesia over the area of distribution of the external popliteal nerve. The electrical reactions of the muscles were normal. Recovery occurred in most cases within four months, but anaesthesia might persist for a year or even longer, and during the course of the disease transient relapses lasting for a few days might occur.

The authors mention three possible causal factors: (1) Nutritional defects, which they rule out because recovery occurred without change of diet except such as was associated with a stay in hospital, and because cases were not seen among the Maltese troops who had the same diet as British troops, or, as they interpret it, "the apparent immunity of Maltese troops." (2) Infection such as a neurotropic virus comparable with anterior poliomyelitis and encephalitis lethargica. [Purely hypothetical.] (3) Trauma, possibly local pressure from sitting with legs crossed or from wearing garters. [Arguing on the analogy of the ruling out of nutritional factors because Maltese troops were not affected, as they saw only some ten cases in the year, the number of "immune" legcrossers or garter-wearers must have been great.] Treatment comprised rest in hospital, physiotherapy and the use of a walking-caliper with foot-drop stop.

[Perhaps in time of war stress and paper shortage we ought not to look for too much detail, but this record is very inadequate. First, the title is not well chosen, for the authors state that they saw cases exhibiting numbness of the thigh; also three with "musculo-spiral palsy of a similar pattern and probably of the same etiology" during the same period, and one of serratus magnus palsy which "would appear to be of the same etiology as that of the external popliteal paralyses." Again, from the clinical aspect, no mention is made of the reflexes, superficial or deep, nor of the presence or absence of tenderness of muscles to pressure, nor the presence or absence of cardiac irregularity. Thirdly, the question of possible toxin is not referred to, except incidentally that "punctate basophilia was not seen." Also, one would like to know how searching was the inquiry made before they came to the conclusion that civilians were "immune." Possible error or deficiency in diet is ruled out on very slight grounds. The people may have been living on a border-line diet and the stress of military life or the anxieties of constant or frequent raids may have precipitated the symptoms in the more susceptible. One would like to know the results of trial of thiamin in treatment or other constituent of Vitamin B complex, for these neuritic conditions are strongly suggestive of pre-beriberi or pre-pellagrous states. It is to be hoped that opportunity may occur for more thorough investigation of this interesting disease or symptom-complex.] *H. Harold Scott.*

VILÉN (A. F.). Contribution à la discussion de la paraplégie spastique épidémique du Kwango. [**On the Epidemic Spastic Paralysis of the Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1942. Dec. 31. Vol. 22. No. 4. pp. 309–317. With 1 plate.

This, which usually starts with fever, is characterized by paralysis, sometimes flaccid, sometimes (and in later stages more often) spastic. The author mentions, with details, two cases, one ending fatally. This was in a boy of five years whose illness began abruptly with fever, headache and cough. Three days later weakness of leg and neck muscles and later the same day he was able to move only his arms and toes, the legs were otherwise in complete flaccid paralysis. Patellar, plantar and Achilles reflexes all absent on both sides; abdominal reflexes marked on the left, absent on the right. Lumbar puncture revealed little of importance, 30 cells per cmm., chiefly mononuclears. He died on the eighth day of illness. Nothing remarkable was found at autopsy. There was an atelectatic state of the left lung, the vessels of the basal ganglia showed perivascular lymphocytic infiltration and the pathological diagnosis of "acute inflammatory encephalomyelitis" was made.

The second case was in a boy of 14 months; the clinical symptoms were very similar and when the author left the Congo 13 months later the child's legs were still spastic and the diagnosis made was "suspected acute anterior poliomyelitis." [But in this disease the paralysis is not spastic.]

The account adds little to the paper by G. TROLLI [see this *Bulletin*, 1939, Vol. 36, p. 501] and the cause is still unknown. To determine whether these are aberrant cases of acute anterior poliomyelitis or not it will be necessary to search for the virus. *H. Harold Scott.*

DeSanctis (Adolph G.) & Di Sant'Agnese (Paul A.). **Tick Paralysis (Report of a Case in New York).**—*Jl. Amer. Med. Assoc.* 1943. May 8. Vol. 122. No. 2. pp. 86–88.

Tick paralysis has been known for almost thirty years, but up to five years ago was thought not to occur outside Canada and the north-western United States, and to be caused by *Dermacentor andersoni* only. Since then cases have been found associated with *D. variabilis*, an American dog-tick. The present case is of interest because the patient, a girl of three years, was infected in Huntington, Long Island. On July 26th, 1942, an "insect" was with difficulty removed from behind the child's right ear. On the 29th she was tired and would not play or walk; next day she was ataxic, without muscular weakness. The symptoms varied in severity during the next week or so but there was no real paralysis. On August 9th a female *D. variabilis* was removed from the back of the child's head and was found to be dead on arrival for identification at the local Health Institute. Within a few hours the improvement in the child's condition was remarkable and in 48 hours the ataxia had disappeared.

Diagnosis has to be made from anterior poliomyelitis and from peripheral neuritis. The symptoms in this case were mild—they may be fatal, after convulsive attacks—and this is thought to point to the bite of the dog-tick, *D. variabilis*, causing disease of less severity than that of *D. andersoni*. [It may be that in this case the tick was dead or moribund and had injected only a small quantity of toxin. Nothing is said as to its being alive on removal; it was dead on reaching the laboratory.] Dog-ticks are very common on Long Island, so it is difficult to see why tick paralysis is rare. In future, doubtless, practitioners will remember the facts and, like those in British Columbia, "will always look for ticks on a child who has had convulsions" or who presents ataxic symptoms of obscure origin.

H. Harold Scott.

McCartney (James L.) **Tropical Neuropsychiatry.**—*War Medicine.* Chicago. 1943. Apr. Vol. 3. No. 4. pp. 351–366. With 4 figs. [Refs. in footnotes.]

This article is difficult to abstract, partly on account of its diffuseness, partly by reason of the peculiar interpretation which the author has given, or at least applied, to the term neuropsychiatry. He starts by calling attention to the fact that many are now being sent to the tropics, climates to which some are certainly unfitted, that they may fall victims to so-called tropical diseases, and present neuropsychiatric sequelae of them. With this all will be prepared to agree. He quotes figures of 15 years ago showing that 36·7 per cent. of American missionaries in tropical countries were sent home on leave on account of neuropsychiatric disturbances. A certain proportion at least of these were of the emotional type to start with. It is well known that business firms and Government departments send their employees and officials home from tropical stations at shorter intervals than they do from temperate climates, on account of, or to prevent, tropical neurasthenia and psychasthenia.

The author goes on to discuss or enumerate neuroses or neuropsychiatric results in certain affections *seriatim*. Thus, heat leads to excessive sweating, loss of chlorides and to cramps. Heat-shock causes giddiness and faintness, and heat hyperpyrexia causes headache, restlessness, delirium and later neurological sequelae, irritability,

intolerance of light, loss of memory and perhaps suicidal impetus. Night-blindness from over-exposure to tropical sunlight may have serious consequences in aviators and naval officers, if the condition is not recognized.

He passes next to matters which would not be generally admitted as in the domain of neuropsychiatry, though on the borderline. Under these the author places change from home environment and lowering of moral standards and intemperance, especially sexual with consequent exhaustion, irritability, depression and headaches, relieved at first by alcohol, and so to over-indulgence in alcohol, to alcoholism, Korsakoff's syndrome and delirium tremens with hallucinations and insomnia. Excess of alcohol limits appetite; less food is taken and signs of vitamin deficiencies appear. By this stepping-stone he passes on to the neuritis of beriberi and the nervous symptoms of pellagra which, with paraesthesias, mental depression, lassitude, insomnia, and a tendency to suicide, are of intense neuropsychiatric importance. From this to food poisoning is a natural step, and epilepsy from cerebral cysticercosis comes into the list. Contaminated food is a well-known cause of diarrhoea and the dysenteries, but to regard the latter under neuropsychiatry because the erotic fixation is, on account of the abdominal discomfort, the tenesmus, and the diarrhoea, transferred from the genital to the anal zone, is a peculiar interpretation of the term. [It would need a Hogarth to depict adequately this tropical Rake's Progress.] But this is not all. The author now reviews various tropical diseases and ranks the ordinary accompanying symptoms under the term. Thus, the toxaemia of ankylostomiasis with debility and melancholia; aching pains associated with dracontiasis; somnolence, headache and Kerandel's sign in trypanosomiasis; headache and pains in the back and limbs in relapsing fever; shivering and headache in rat-bite fever; headache and body pains of yellow fever; the joint and limb pains of dengue; the sweats, hyperaesthesia and neuralgias of undulant fever; the headache of malaria; the delirium, stupor, coma and convulsions of the cerebral form; the low blood pressure of kala azar; few would rank these as coming under the term "tropical neuropsychiatry". At the end of his article the author refers to leprosy and syphilis, both of which are, of course, of great neuropsychiatric importance. [The subject of neuropsychiatry in the tropics, whether as a sequela of tropical disease or not, is of much interest and of great importance, but it loses rather than gains interest when so wide an interpretation is given to the term.]

H. Harold Scott.

CHABEUF & LINHARD. Considérations sur le syndrome ano-génital de Jersild d'après 120 observations originales. [**Remarks on the Ano-Genital Syndrome of Jersild, based on 120 Original Studies.**]—*Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* Brazzaville. 1942. Oct. Vol. 1. No. 2. pp. 36–50.

This article is based on a study of 120 cases of the Jersild syndrome in Ayos, French Cameroons, Africa. After giving a good detailed description of the signs, symptoms and course of the disease, the authors discuss carefully the causation under the headings of syphilis, gonorrhoea, soft chancre, the Nicolas-Favre disease, tuberculosis, streptococcal infection, ulcerative granuloma, mycosis, rectal bilharzia, cancer, irritant enemata, and a combination of two or more of these; they conclude that three-quarters of their cases were due to:—

gonorrhoea+Nicolas-Favre disease+irritant enemata; the latter two of these+syphilis; syphilis+gonorrhoea+irritant enemata; and syphilis+gonorrhoea+Nicolas-Favre disease. The remaining quarter are attributed to syphilis alone, gonorrhoea alone, or irritant enemata alone. As regards the irritant enemata, which, in the authors' view, play such an important part in the causation of the condition, it appears that the natives in the district of Ayos have great faith in the introduction into the rectum of such substances as pepper, lemon juice, astringent barks, tobacco juice and the juices of various mysterious plants, for the cure of digestive and pelvic troubles. These substances cause violent irritation which is borne with fortitude in the hope of a cure.

For treatment, the authors have not used sulphonamides or rectal diathermy, but rely on injections of tartar emetic in conjunction with dilatation of the rectal stricture. The latter is effected by means of Hegar's bougies and is supplemented by removal of granulations and radical cure of the fistulae. For prognosis, and as a guide to treatment the authors consider the Weltmann coagulation test [*Bulletin of Hygiene*, 1938, Vol. 13, p. 1006; 1940, Vol. 15, p. 351] to be useful. Those cases in which the titre was over 36 were considered to be incurable by medical means; in those with titres between 30 and 36 the outlook was good; and with a titre below 30 stricture formation was improbable. *L. W. Harrison.*

WIJESUNDARA (D. P.). **Notes on the Mosquito Fauna of Rot-holes in Trees and Bamboo Stumps in Ceylon.**—*Jl. Malaria Inst. of India.* 1942. Dec. Vol. 4. No. 4. pp. 451–456. With 1 graph.

In a large rot-hole in a tree near the Colombo laboratory, from which collections were made from October 1940 to February 1942, the predominant species, which together made up 96 per cent. of all the larvae taken, were *Culex brevipalpis*, *Aëdes albopictus* and *Aëdes gubernatoris*. *Culex fatigans* was found rarely and *Aëdes aegypti* (39 specimens out of a total of some 7,000) still more rarely. In tree-holes and bamboo stumps in hill-country districts of Ceylon *Aëdes albopictus* was the dominant species. *Aëdes aegypti* was very rare. The only anopheline was *A. leucosphyrus* which was found on five occasions. *V. B. Wigglesworth.*

BATES (Marston). **Mosquitoes as Vectors of Dermatobia in Eastern Colombia.**—Reprinted from *Ann. Entom. Soc. America.* 1943. Mar. Vol. 36. No. 1. pp. 21–24.

There seems to be no constant preference by the ovipositing female of Dermatobia for any one species of mosquito. In two areas in Eastern Colombia *Psorophora ferox* showed the highest degree of infestation, 8·4 and 1·6 per cent. of the wild-caught females carrying eggs. *Aëdes serratus* stood next with 2·2 and 0·2 per cent. In another area no *P. ferox* were infested but 2·3 per cent. *A. serratus*. Probably small calypterate flies are as frequently vectors as are mosquitoes. Indeed, any diurnal fly which is attracted to animals and is not too small or too big or too active to be handled by the Dermatobia female can probably be utilized. The egg-laying female is attracted to horses and cattle; she pounces upon small flies as they approach to within a centimetre or so of her, catching them in mid-air. Then, usually while hovering, she holds them head forward and back up against her thorax and plants the eggs rapidly on the abdomen of the captive. *V. B. Wigglesworth.*

FOX (I.). **The Respiratory Trumpet and Anal Segment of the Pupae of some Species of Culicoides (Diptera : Ceratopogonidae).**—Reprinted from *Puerto Rico J. Pub. Health & Trop. Med.* 1942. June. pp. 412–425. With 24 figs. [Refs. in footnotes.]

The paper is in the main a highly specialized study of the pupae of biting midges, and likely to interest North American dipterists. It seems that these pupae exhibit very striking specific differences, particularly in the respiratory trumpet and the anal segment : many of these are figured. Those species which seem most similar in adult genitalia are also similar in pupal characters. *P. A. Buxton.*

PESCOTT (R. T. M.). **Two Springtails (Collembola) of Medical Interest.**—*Health Bull.* Melbourne. 1942. July–Dec. Nos. 71 & 72. pp. 1949–1950. With 1 fig.

The majority of Collembola (Springtails) are phytophagous ; one species, *Achorutes siaticus*, plays a part in keeping sewage filter-beds free from slimy growth and thus obviates frequent cleaning. Two instances of Entomobrya attacking human beings are here recorded. The patients complained of a sharp biting sensation followed by irritation and papules like mosquito bites and much itching. Search discovered specimens of the insect on the body and the clothes. Sterilization of the clothes destroyed the insects and the irritation did not recur.

In one case the insect had passed to the patient when grass, weeds and soil were disturbed in making a garden. The species in this case

Springtail (*Entomobrya* sp.).
[Reproduced from *Health Bulletin*, Melbourne.]

was *Entomobrya multifasciata*, 1/12 inch in length, yellowish-brown in colour, with an irregular line across each segment, and with bluish antennae.

In the second instance, the nursing staff of a military hospital in Victoria suffered, and the insect had been introduced with flowers. The species was *E. tenuicauda*, the same length as the former, but whitish in colour with dark pigmented bands on the posterior halves of the segments, and the antennae, also bluish in colour, are twice as long as the head. It has been thought that the easily detachable ciliated hairs on the insect cause the irritation, but more probably the insect itself is the cause as the patient states that there is a definite sensation of a bite. *H. Harold Scott.*

SENEVET (G.), MOUTIER (P.), ALCAY (L.), GROS (G.) & BOURGAREL (R.). Huit cas de coccidiose humaine dans le Sud tunisien. [**Eight Cases of Human Coccidiosis in Southern Tunisia.**]—*Arch. Inst. Pasteur d'Algérie.* 1940. Dec. Vol. 18. No. 4. pp. 468–470.

During the routine examination in Tunisia of specimens of faeces from 1,471 cases of intestinal disorder, occurring presumably during the

first two years of the present war, eight cases of coccidiosis were encountered. The developed oöcysts justified the conclusion that the coccidia were of the genus Isospora. It seems evident that a centre of infection exists in southern Tunisia. *C. M. Wenyon.*

STONE (R. G.). **Health in Tropical Climates.**—*Yearbook of Agriculture, 1941.* Washington. pp. 246–261. With 1 fig. [40 refs.] [Yearbook Separate. No. 1799.]

In estimating the feeling of warmth or discomfort of an environment it would be desirable to have some standard criteria with which to compare results. Various methods are available for combining in a single index the effects of some of the physical factors contributing to the subjective impressions of an environment. Thus the American Effective Temperature scale takes note of the temperature, humidity and rate of movement of the air. Some of these indices do show fairly well the relative stress which different climates put upon the average subject's heat- and temperature-regulating mechanism, but at the same time wide individual variations in reaction will be noted.

One of the factors contributing to this personal difference is the remarkable ability of the body to adapt itself, after a certain length of exposure, to a new level of climatic conditions by shifting its "comfort zone," and another is the existence of great differences between individuals in their responses, voluntary and involuntary, to given atmospheric conditions or changes. Thus, when a heating and ventilating system is being designed, engineers have found it impracticable or impossible to produce conditions that will please more than 50 to 65 per cent. of an average group of people at any given season. Very extreme conditions of either heat or cold can be faithfully indicated, but between these broad limits a wide variety of comfortable and uncomfortable conditions is found according to individual circumstances.

Weather changes, if not extreme, are stimulating, and the concept of comfort is quite meaningless so far as the effect of a climate is concerned, unless variability or monotony are considered at the same time. For the larger part of the tropics, indeed, experience has shown that the monotony of the weather is far more intrinsically disadvantageous to the maintenance of good health than its warmth or humidity. Where the variability from day to day is generally small, the body tends to lose its ability to adapt itself to any marked change. The effect of monotony, then, is to increase the sensitivity to changes, so that a small change which would pass unnoticed in a more variable climate may contribute to some definite malaise in a monotonous environment. On the other hand, a wide daily range of temperature or of wind velocity may produce a similar problem, though these conditions are sometimes the healthiest. We have yet to learn just what kind of changes are harmful, and a careful study of the frequencies of small weather variations in the tropics might prove of more value than many of the averages usually available in climatic statistics.

A healthy man acclimatized to working under conditions where the air temperatures are high may run a body temperature of 103° or 104°F. while exercising in the heat without marked ill effects. The process of acclimatization to heat consists in "learning" to sweat more freely, but with a smaller total amount of salt in the sweat; this must be accompanied by a greater water intake and an adequate

amount of salt in the diet or water. Insufficient salt is the main cause of heat cramps as well as other less acute effects of heat. The shift of the comfort zone to higher limits of temperature and humidity is also a mark of acclimatization, but it is not certain just what this signifies beyond a reduction of the thresholds of nervous sensibility to heat; possibly it decreases metabolism and delays nervous exhaustion.

There is evidence that acclimatization to heat probably involves still other mechanisms. For example, the basal metabolism is said to decrease somewhat; there seems to be an unconscious tendency to choose a diet of less protein and more carbohydrate; the number of sweat glands may increase, at least after years of exposure; breathing may become slower and deeper, and blood pressure may be lowered. These are difficult physiological problems that await more careful investigation.

There are possibilities that air conditioning can make certain uncomfortable climates not only more bearable but more healthful, but the cost is so high that its general use will be greatly limited by economic conditions. The enervating effects of certain equatorial climates where hot nights are frequent could probably be diminished materially by air-conditioned sleeping rooms. In general, however, marked cooling of interiors is dangerous in the tropics owing to the chill and shock experienced when the hot moist body suddenly passes into a cool dry place. Consequently considerable dehumidification of the air with only a small degree of cooling is recommended to obtain comfort indoors. *C. G. Warner.*

BOOK REVIEWS

FREAR (Donald E. H.) [Ph.D., etc.]. **Chemistry of Insecticides and Fungicides.** Second Printing.—pp. viii+300. With 31 figs. 1942. New York: D. van Nostrand Co., Inc., 250 Fourth Avenue. [24*s*.]

Insecticides are used to a far greater extent in the control of agricultural insect pests than in medical entomology. The bulk of this book therefore concerns the agriculturist more than the medical man. But much of the knowledge gained in the sphere of agriculture can be applied in the control of insects of medical importance. It is therefore useful to have the chemical and physical properties of all the chief insecticidal substances brought together into one volume.

Under stomach poisons, the whole range of arsenicals, including Paris green, and the various fluorine compounds occupy most space; but hellebore, the dinitro aromatic derivatives, phenothiazine, etc., are dealt with shortly. Of more importance for medical purposes are the contact poisons, particularly pyrethrum, derris and the organic thiocyanates. The chemistry of the pyrethrins, and of rotenone and the other toxic constituents of derris, is described fairly fully. In connexion with pyrethrum it is worth pointing out that in ordinary powdered pyrethrum flowers a large part of the pyrethrin content is held within the unbroken cell walls of the plant material and thus is largely wasted. Much more economical use of the active principles is obtained by extracting them from the flowers and using the extract to coat the particles of a suitable mineral dust. A chapter is devoted to sulphur and the inorganic sulphur compounds. Medical men concerned with the treatment of scabies might gain some useful information from the great amount of work that has been done in the control of parasites of

plants and animals by these means. The sections which deal with petroleum oils and coal tar derivatives treat these solely from the horticultural point of view; their use against mosquito larvae scarcely finds any mention. The common fumigants and the methods for their application are described. The chapter on the physical properties of insecticides and the factors involved in securing their spread or emulsification will be found useful, although this deals solely with the spread and adhesion of materials sprayed on to vegetation and not with the analagous problem of the spread and toxicity of oils as used against mosquito larvae.

The book as a whole is written in a clear and concise style and is well provided with references. But it covers such a large subject and in so small a space that the treatment is necessarily superficial.

V. B. Wigglesworth.

KOMP (W. H. W.) [Senior Medical Entomologist, U.S. Public Health Service.] **The Anopheline Mosquitoes of the Caribbean Region.**—*Nat. Inst. Health Bull. No. 179.* Washington. pp. ix+195. With 155 figs. [Bibliography.] 1942. Washington: U.S. Govt. Printing Office. [35 *cents.*]

The region covered by this monograph is the lowland coastals trip encircling the Caribbean Sea, extending from the north-eastern tip of the Yucatan Peninsula of Mexico southward through Honduras, Nicaragua, Costa Rica and Panama, around the northern coasts of Colombia and Venezuela to Trinidad and thence north-west through the Lesser and Greater Antilles to the western tip of Cuba. The fauna of the mountainous hinterland is not included. The lowland Caribbean area is tolerably homogeneous; most of the species found there have a wide distribution. In all 22 species of Anopheline mosquitoes are known from the region and all but five of these are found in the Republic of Panama. The most widespread is *Anopheles pseudopunctipennis*; the most dangerous carrier of malaria is *A. albimanus*, which is likewise widely distributed, though it is curiously absent from eastern Venezuela and the north-east coast of South America. The monograph deals with the geographical distribution of these 22 species, their status as vectors of malaria and particularly with their classification and identification.

In order that the work may be of use to others besides entomologists those structural characters used for identification are fully and very clearly described in an introduction and there is a list of equivalent entomological terms in English, Spanish and Portuguese. There are keys to the adult females, the larvae and the male terminalia, and in an appendix these keys are reproduced in Spanish. There are detailed descriptions of the adults, larvae and male terminalia of each species. The classification adopted is that of Edwards in his catalogue of the Culicidae, with the exception that the curious *Kerteszia* group, all of which live in water in plant tissues (for instance in the water in the leaf-bases of bromeliads), has been raised to the rank of a subgenus—an arrangement in which Edwards concurred. Little is said about egg characters, although it is recognized that the great structural differences that exist within a given species may ultimately prove indicative of distinct races or even of true species. Dr. Komp has had extensive experience in the Caribbean region, having collected material of every species treated and discovered or described several new species. He has produced a thoroughly competent monograph on the anophelines of the area.

V. B. Wigglesworth.

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Prospectus from the Laboratory Secretary, School of Tropical Medicine, Pembroke Place, Liverpool, 3.

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